

VPDES Permit Fact Sheet

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VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a Major, Municipal permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 *et seq.* The discharge results from the operation of a municipal sewage treatment plant. This permit action consists of reissuing the permit with revisions to the permit, as needed due to changes in applicable laws, guidance, and available technical information.

1. Facility Name and Address:
Parkins Mills WWTF
158 West Parkins Mill Road
Winchester, VA 22602
Location: 158 West Parkins Mill Road
SIC Code: 4952 - Sewerage Systems
2. Permit No. VA0075191
Expiration Date: March 31, 2008
3. Owner Contact: Name: Mr. Jesse W. Moffet
 Title: Executive Director
 Telephone No: (540) 722-3579
4. Application Complete Date: August 15, 2007

Permit Drafted By: Trevor Wallace Date:
Reviewed By: Keith Showman Date:
 Brandon Kiracofe Date:

Public Comment Period: _____ to _____, 2007
5. Annual Permit Maintenance Fee: \$5,350.00 VPDES Municipal Major / 2 MGD - 10 MGD
Highest Permitted Flow: 5.0 MGD TMP? Yes > 5 outfalls? No
6. Receiving Stream Name: Opequon Creek River Mile: 43.99
 Basin: Potomac Subbasin: N/A
 Section: 11 Class: IV
 Special Standards: pH
 303(d) list? Yes Tidal Waters? No
Watershed Name: VAV – B08R Upper Opequon Creek
7. Planning Information: See Appendix C: [Limiting Factors – Overview](#)
8. Operator License Requirements: II
9. Reliability Class: II (Assigned 8/18/87)
10. Permit Characterization:

☐ Private ☐ Federal ☐ State ☒ POTW ☐ PVOTW
☐ Possible Interstate Effect ☐ Interim Limits in Other Document (attach copy of CSO)

Introduction

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11. Description of Treatment Works Treating Domestic Sewage:

[Appendix A](#)

Total Number of Outfalls = 1

Operation and Maintenance (O&M) Manual: Approved May 21, 1997

12. Discharge Location Description and Receiving Waters Information:

[Appendix B](#)

Topo Map Name: Stephens City

Topo Map Number: 153D

13. Antidegradation (AD) Review & Comments: Tier: 1

The State Water Control Board's Water Quality Standards (WQS) includes an AD policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of AD protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The AD policy prohibits new or expanded discharges into exceptional waters.

The AD review begins with a Tier determination. The Parkins Mills WWTF discharges to a segment of Opequon Creek, which is classified as Tier 1. This finding is based on the fact that new chloride effluent data evaluated at this reissuance statistically suggests chloride WQS chronic criteria is likely not being attained downstream of the discharge. Therefore, Opequon Creek at the point of this facility's discharge is designated as Tier 1. AD baselines are not calculated for Tier 1 waters.

14. Site Inspection: Performed by: Trevor Wallace

Date: December 19, 2007

15. Effluent Screening and Effluent Limitations:

[Appendix C](#)

16. Rationale for Toxics Management Program (TMP) Requirements:

[Appendix D](#)

17. Management of Biosolids:

Biosolids are disposed in the Frederick County Regional Landfill located near Winchester, Virginia. The facility's Sludge Management Plan is approved with the reissuance of the permit.

18. Permit Changes and Bases for Special Conditions:

[Appendix E](#)

19. Material Storage: This permit requires that the facility's O&M Manual include information to address the management of wastes, fluids, and pollutants which may be present at the facility, to avoid unauthorized discharge of such materials (9 VAC 25-31-280.B.2.).

20. Antibacksliding Review: This permit complies with Antibacksliding provisions of the VPDES Permit Regulation, 9 VAC 25-31-220.L.

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21. TMDL and Impaired Use Status Evaluation: Opequon Creek immediately downstream of this discharge is impaired with elevated bacteria concentrations. The impairment is addressed in an EPA approved TMDL report with an E. coli wasteload allocation of 1.10×10^{13} cfu/yr. The facility is also currently assigned a TMDL TSS WLA of 87.04 metric tons/yr. This section of Opequon Creek was previously impaired by excess sedimentation, but current benthics data indicate the stream now meets Aquatic Life Use WQS criteria. Opequon Creek downstream of Abrams Creek is, however, still considered impaired by excess sedimentation. The EPA approved TMDL addresses both the upper (upstream of Abrams Creek) and lower (downstream of Abrams Creek) sections of Opequon Creek.
22. Regulation of Users per 9 VAC 25-31-280.B.9: N/A – This facility is owned by a municipality.
23. Storm Water Managment:
Application Required? ☐ Yes ☒ No
- No Exposure Certification for this facility was previously approved on September 9, 2002. The permittee submitted an updated No Exposure Certification Form with their application, which indicates there continues to be no industrial activities or materials exposed to storm water discharged from the property. No Exposure Certification is approved as part of the reissuance application.
24. Compliance Schedule: A 4-year compliance schedule for attaining compliance with chloride limits is include in the permit. Also, this facility has obtained coverage under the General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia (9 VAC 25-820-10 et seq.) that includes a Compliance Schedule for achieving annual TN and TP Waste Load Allocations.
25. Variances/Alternate Limits or Conditions: The applicant requested a waiver for:
- EPA Form 2A, Part A, Item 12 parameters based on the fact that the data is already on file at DEQ. The effluent daily monitoring logs for the previous permit cycle include monitoring data for the Item 12 parameters.
 - EPA Form 2A, Part B, Item 6 parameters based on the fact that the data is already on file at DEQ. The effluent daily monitoring logs for the previous permit cycle include monitoring data for the Item 6 parameters, with the exception of Oil and Grease (O&G) and TDS. Data for these two parameters have, however, been previously submitted and are on file at DEQ. There are no applicable WQS criteria for O&G and TDS for this discharge.
 - EPA Form 2A, Part D parameters based on the fact that the data is already on file at DEQ. This data was previously submitted by the applicant in 2002. The applicant noted that no new significant industrial users have been connected to the system since the 2002 sampling events. Additionally, a full scan of the WQS parameters will be required within one year following CTO issuance for the expanded 5.0 MGD facility, which is scheduled for completion in October 2009.
 - Form 2A, Part E toxicity monitoring based on the fact that toxicity monitoring data is already on file at DEQ. This data was submitted by the applicant during the previous permit cycle.
- The waiver requests have been approved based on the justification provided by the permittee and the fact that EPA did not comment on the waiver requests.
26. Financial Assurance Applicability per 9 VAC 25-650-30: N/A – This facility is owned by a municipality.
27. Virginia Environmental Excellence Program (VEEP) Evaluation:
At the time of this reissuance, is this facility considered by DEQ to be a participant in the Virginia Environmental Excellence Program in good standing at either the Exemplary Environmental Enterprise (E3) level or the Extraordinary Environmental Enterprise (E4) level?
☐ Yes ☒ No

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28. Nutrient Trading Regulation (9VAC 25-820):

Nutrient GP Required: ☒ Yes ☐ No

Nutrient GP No.: VAN010057, effective January 1, 2007. The permittee will need to submit a new Registration Statement prior to the GP expiration in order to maintain coverage.

29. Threatened and Endangered (T&E) Species Screening:

Because this is not a permit issuance or a reissuance that allows for increased discharge flows, T&E screening is not required.

30. Public Notice Information: All pertinent information is on file, and may be inspected and copied by contacting Trevor Wallace at: DEQ-Valley Regional Office, P.O. Box 3000, Harrisonburg, Virginia 22801, Telephone No. (540) 574-7892, thwallace@deq.virginia.gov.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

31. Historical Record

Original VPDES permit issued, DESIGN FLOW = 0.5 MGD	8/18/87
Original STP CTO issued	N/A
Permit reissuance, include limits for facility expansion to DESIGN FLOW = 2.0 MGD	4/2/93
CTO for 2.0 MGD facility issued	N/A
Permit reissuance for 2.0 MGD facility	4/2/98
Permit reissuance for 2.0 MGD facility, new quarterly TN and TP monitoring requirements, numeric effluent TRC limits added to permit, receiving stream designated Tier 1 due to full allocation of chlorine.	4/3/03
Permit modification, change TN and TP sample type to 24 HC	10/9/03
Permit modification, add permit flow tiers for DESIGN FLOWS = 2.0 MGD, 2.0/3.0 MGD, 3.0/4.3 MGD, 4.0/6.3 MGD, 5.0/7.6 MGD, nutrient monitoring and nutrient limits added to permit.	12/2/05
Permit modification, removed TN/TP load limits superseded by Nutrient GP, revised TN effluent concentration limit for an expanded facility from 3.0 mg/L to 4.0 mg/L	4/25/07
Permit reissuance, with DESIGN FLOWS = 2.0 MGD (Existing), 5.0 MGD (Expanded); PERMITTED FLOWS applicable to the expanded facility: 2.0 MGD 3.0 MGD, 4.0 MGD	Pending

N/A = Not Available

APPENDIX A

DESCRIPTION OF TREATMENT WORKS TREATING DOMESTIC SEWAGE

Wastewater Generation:

The Parkins Mills WWTF primarily receives domestic wastewater generated by the residents of Frederick County and Stephens City. Approximately 15% of the total influent flow is generated by the industrial dairy discharger HP Hood, with remaining 85% generated by domestic sources. The total population served is listed as 16,231 in the EPA Form 2A application. Wastewater is transferred to the WWTF via a separate sanitary sewer system.

Wastewater Treatment:

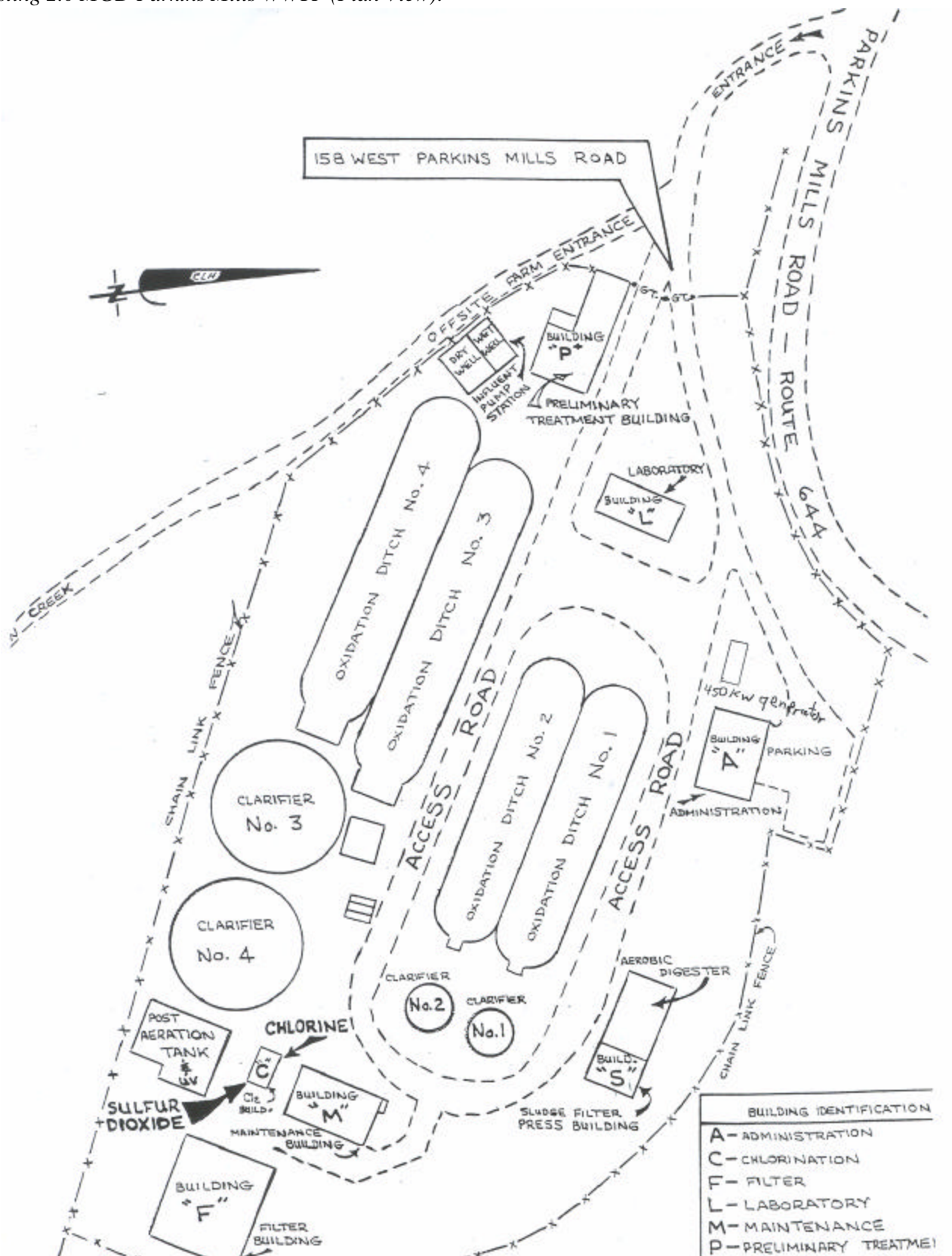
The current wastewater treatment system is rated for a design flow of 2.0 MGD, and is shown in the attached schematics. Flow equalization basins precede the treatment works. Preliminary treatment is achieved using a bar screen and grit channel. Primary and secondary treatment are achieved using four oxidation ditches. Wastewater is transferred from the oxidation ditches into secondary clarifiers, which are followed by prechlorination and sand filtration. The treated wastewater is disinfected using ultraviolet light. Prior to being discharged to the receiving stream at outfall 001, the wastewater is dechlorinated and aerated. Waste activated sludge is thickened using a flocculation/chemical addition system. The sludge is dewatered using a centrifuge, prior to being disposed in the Frederick County Landfill.

NOTE: The wastewater treatment scheme described above represents only the existing 2.0 MGD facility. The facility is currently expanding and upgrading to include nutrient removal technology. Additional oxidation ditches, secondary clarifiers, and filters are proposed for installation. This permit reissuance includes the following flow tiers:

1. 2.0 MGD (Existing design flow tier)
2. 2.0 MGD (Future permitted flow tier)
3. 3.0 MGD (Future permitted flow tier)
4. 4.0 MGD (Future permitted flow tier)
5. 5.0 MGD (Future design flow tier)

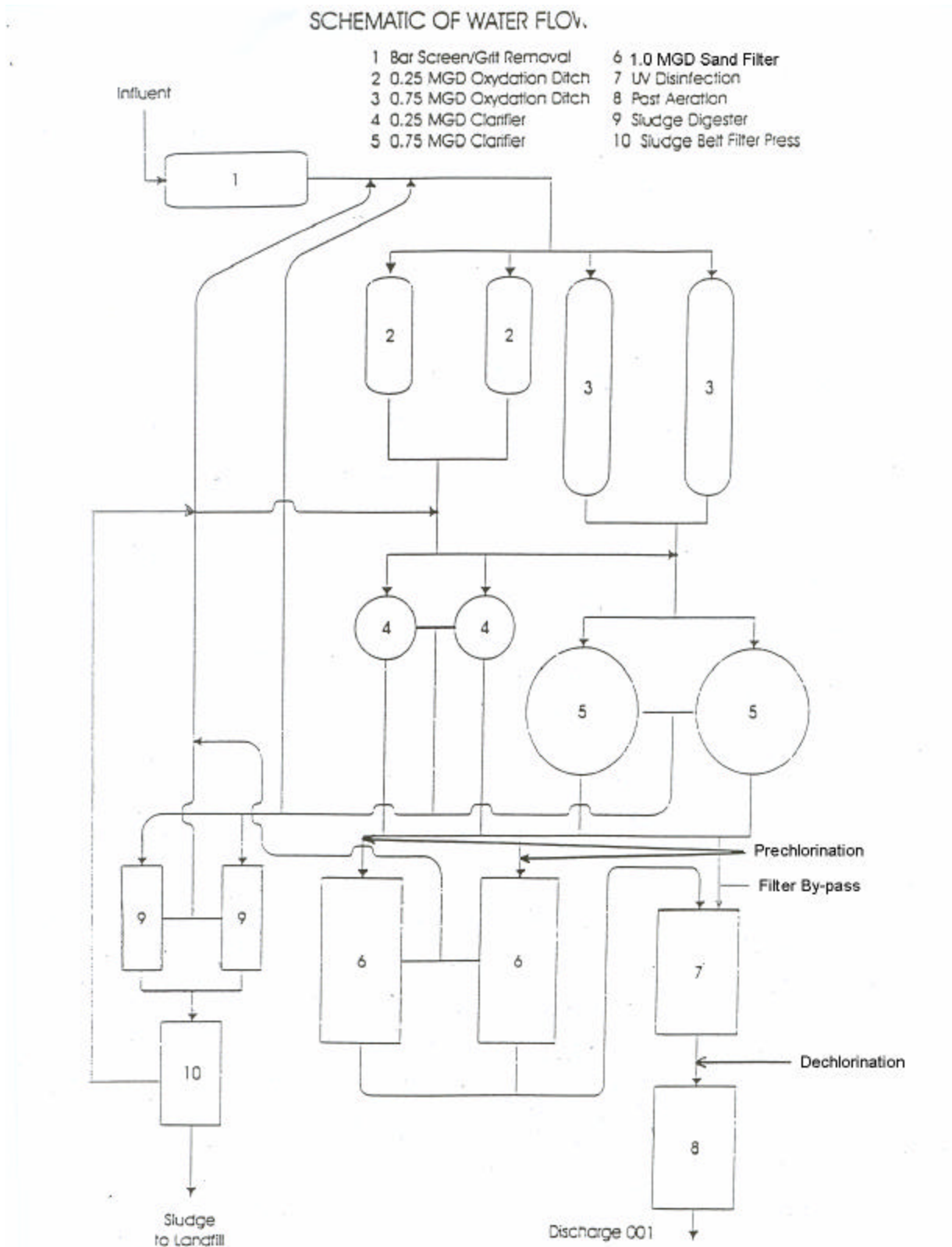
Fact Sheet – VPDES Permit No. VA0075191 – Parkins Mills WWTF

Existing 2.0 MGD Parkins Mills WWTF (Plan View):



Fact Sheet – VPDES Permit No. VA0075191 – Parkins Mills WWTF

Existing 2.0 MGD Parkins Mills WWTF (Flow Schematic):



APPENDIX B

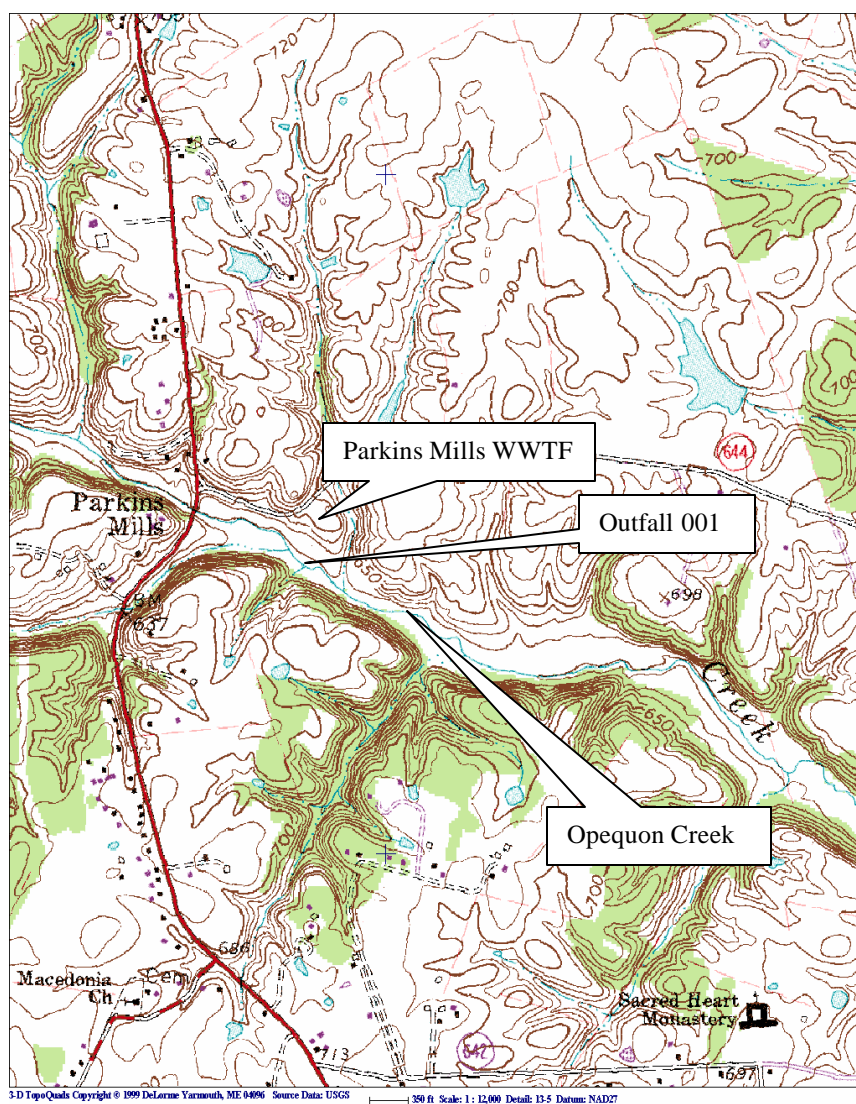
DISCHARGE LOCATION DESCRIPTION AND RECEIVING WATERS INFORMATION

The Parkins Mills WWTF discharges to Opequon Creek in Frederick County. The topographical map below shows the location of the treatment plant and Outfall 001.

Relevant points of interest within the watershed and in the vicinity of the discharge are shown on the enclosed Water Quality Assessment TMDL Review and corresponding map.

Critical flows in the receiving stream at the discharge point are described in a Flow Frequency Determination that is presented in this appendix.

Mixing zone predictions were performed using information specific to the discharge and receiving stream characteristics with the Agency's Virginia DEQ Mixing Zone Analysis Version 2.1 program. Wet season and annual average conditions were examined, and the results are presented in this appendix.



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WATER QUALITY ASSESSMENTS TMDL REVIEW						
POTOMAC-SHENANDOAH RIVER BASIN						
8/15/2007						
IMPAIRED SEGMENT:						
SEGMENT ID	STREAM	SEGMENT START	SEGMENT END	LENGTH	PARAMETER	
VAV-B08R-01	Opequon Creek	57.26	23.56	33.7	E-coli	
VAV-B09R-01	Abrams Creek	10.8	0.00	10.8	Fecal Coliform, Benthic	
VAV-B09R-04	Redbud Run	8.02	0.00	8.02	Fecal Coliform, Benthic	
PERMITS:						
PERMIT:	FACILITY:	STREAM:	MILE	LAT	LONG	WBID
VA0075191	Parkins Mill STP	Opequon Creek	43.99	390627	0780913	VAV-B08R
VA0002356	Heinz, USA	Abrams Creek	7.09	390958	0781037	VAV-B09R
VA0051373	National Fruit-Winchester	Town Run	1.68	391109	0781021	VAV-B09R
VA0058025	Plumly, P.W.	Town Run	1.04	391055	0780947	VAV-B09R
VA0065552	Opequon WRF	Opequon Creek	32.66	391036	0780429	VAV-B08R
VA0076384	Federal Mogul Friction Products	Abrams Creek	6.7	390953	0781012	VAV-B09R
VA0087815	Fay Spring WTP	Redbud Run X-Trib	0.02	391218	0780753	VAV-B09R
VA0088471	Frederick County Landfill	Opequon Creek	36.19	390837	0780525	VAV-B08R
VA0089010	CDA Spirituality Center	Opequon Creek X-Trib	0.23	390547	0780815	VAV-B08R
VA0089150	Winchester Medical Center	Abrams Creek X Trib	0.77	391126	0781151	VAV-B09R
VA0076384	Federal Mogul Friction Products	Abrams Creek X-Trib	6.7	390915	0781011	VAV-B09R
MONITORING STATIONS						
STREAM	NAME	MILE	RECORD	LAT	LONG	
Abrams Creek	1AABR000.78	0.78	08/25/76	391043	0780508	
Opequon Creek	1AOPE036.13	36.13	07/01/91	390852	0780526	
Redbud Run	1ARED000.46	0.46	07/01/91	391113	0780505	
Opequon Creek	1AOPE038.36	38.36	7/1/97	390713	0780614	
Roseville Run	1BRSC001.42	1.42	7/1/98	390518	0780351	
Opequon Creek	1AOPE044.17	44.17	8/2001	390630	0780921	
Opequon Creek	1AOPE031.26	31.26	7/2003	391136	780426	
Dry Marsh Run	1ADRS000.11	0.11	7/2003	391135	780409	
Opequon Creek	1AOPE044.01	44.01	3/12/01	390627	780912	
Opequon Creek	1AOPE039.70	39.7	7/2001	39633	-78637	
Opequon Creek	1AOPE029.61	29.61	1984	391215	0780427	
Opequon Creek	1AOPE034.53	34.53	1987	390938	0780504	
PUBLIC WATER SUPPLY INTAKES:						
OWNER:	STREAM:	RIVER	MILE:			
None						

Parkins Mills WWTF- TMDL Information
Potomac-Shenandoah River Basin
August 15, 2007



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**MEMORANDUM
DEPARTMENT OF ENVIRONMENTAL QUALITY
VALLEY REGIONAL OFFICE**

4411 Early Road – P.O. Box 3000

Harrisonburg, VA 22801

SUBJECT: Flow Frequency Determination
Parkins Mills WWTF – VPDES Permit No. VA0075191, Frederick County

TO: File

FROM: Trevor Wallace

DATE: November 8, 2007

This memo updates Eric Aschenbach's flow frequency determination dated January 3, 2005.

The Parkins Mills WWTF discharges to Opequon Creek near Stephens City, Virginia. The VDEQ operated a continuous record gage on Opequon Creek near Berryville, Virginia (#01615000) from 1943-1997. The gage is located downstream of the discharge point at the Route 7 bridge in Frederick County, Virginia. In July 1988, approximately 1000 feet upstream of the gage, the 6.0 MGD Opequon Wastewater Reclamation Facility began discharging to Opequon Creek. Therefore, the flow frequencies for the reference gage are based only on the period of record from 1943 to 1988. Since the Parkins Mills WWTF did not begin discharging to Opequon Creek until about September 1989, its flow did not impact the gage during the selected period of record. The flow frequencies for the gage and the discharge point are presented below. The values at the discharge point were determined by drainage area proportions and do not address any other discharges, withdrawals, or springs located between the gage and the discharge point.

Opequon Creek near Berryville, VA (#01615000):

Drainage Area = 57.4 mi²

1Q10 = 1.1 cfs	High Flow 1Q10 = 3.1 cfs
7Q10 = 1.5 cfs	High Flow 7Q10 = 4.1 cfs
30Q10 = 2.2 cfs	High Flow 30Q10 = 6.7 cfs
30Q5 = 3.1 cfs	HM = 10.2 cfs
	Annual Average = 42.9 cfs

Opequon Creek at discharge point:

Drainage Area = 25.6 mi²

1Q10 = 0.49 cfs (0.32 mgd)	High Flow 1Q10 = 1.38 cfs (0.89 mgd)
7Q10 = 0.67 cfs (0.43 mgd)	High Flow 7Q10 = 1.83 cfs (1.18 mgd)
30Q10 = 0.98 cfs (0.63 mgd)	High Flow 30Q10 = 2.99 cfs (1.93 mgd)
30Q5 = 1.38 cfs (0.89 mgd)	HM = 4.55 cfs (2.94 mgd)
	Annual Average = 19.1 cfs (12.3 mgd)

The high flow months are December through May.

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Mixing Zone Predictions:

Critical Annual Flow Mixing Conditions	Critical Wet Season Flow Mixing Conditions
<p align="center"><u>Discharge Flow of 2.0 MGD</u></p> <p>Effluent Flow = 2.0 MGD Stream 7Q10 = 0.43 MGD Stream 30Q10 = 0.63 MGD Stream 1Q10 = 0.32 MGD Stream slope = 0.0025 ft/ft Stream width = 8 ft Bottom scale = 2 Channel scale = 1</p> <p>-----</p> <p>Mixing Zone Predictions @ 7Q10 Depth = .7083 ft Length = 100.46 ft Velocity = .6638 ft/sec Residence Time = .0018 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 30Q10 Depth = .7451 ft Length = 95.82 ft Velocity = .683 ft/sec Residence Time = .0016 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 1Q10 Depth = .6877 ft Length = 103.27 ft Velocity = .6527 ft/sec Residence Time = .0439 hours</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.</p>	<p align="center"><u>Discharge Flow of 2.0 MGD</u></p> <p>Effluent Flow = 2.0 MGD Stream 7Q10 = 1.18 MGD Stream 30Q10 = 1.93 MGD Stream 1Q10 = 0.89 MGD Stream slope = 0.0025 ft/ft Stream width = 9 ft Bottom scale = 2 Channel scale = 1</p> <p>-----</p> <p>Mixing Zone Predictions @ 7Q10 Depth = .7743 ft Length = 118.39 ft Velocity = .7064 ft/sec Residence Time = .0019 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 30Q10 Depth = .8866 ft Length = 104.28 ft Velocity = .7624 ft/sec Residence Time = .0016 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 1Q10 Depth = .7286 ft Length = 125.28 ft Velocity = .6822 ft/sec Residence Time = .051 hours</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.</p>
Virginia DEQ Mixing Zone Analysis Version 2.1	

Fact Sheet – VPDES Permit No. VA0075191 – Parkins Mills WWTF

Critical Annual Flow Mixing Conditions	Critical Wet Season Flow Mixing Conditions
<p align="center"><u>Discharge Flow of 3.0 MGD</u></p> <p>Effluent Flow = 3.0 MGD Stream 7Q10 = 0.43 MGD Stream 30Q10 = 0.63 MGD Stream 1Q10 = 0.32 MGD Stream slope = 0.0025 ft/ft Stream width = 9 ft Bottom scale = 2 Channel scale = 1</p> <p>-----</p> <p>Mixing Zone Predictions @ 7Q10 Depth = .8126 ft Length = 113.19 ft Velocity = .726 ft/sec Residence Time = .0018 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 30Q10 Depth = .8426 ft Length = 109.41 ft Velocity = .741 ft/sec Residence Time = .0017 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 1Q10 Depth = .7958 ft Length = 115.4 ft Velocity = .7175 ft/sec Residence Time = .0447 hours</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.</p>	<p align="center"><u>Discharge Flow of 3.0 MGD</u></p> <p>Effluent Flow = 3.0 MGD Stream 7Q10 = 1.18 MGD Stream 30Q10 = 1.93 MGD Stream 1Q10 = 0.89 MGD Stream slope = 0.0025 ft/ft Stream width = 10 ft Bottom scale = 2 Channel scale = 1</p> <p>-----</p> <p>Mixing Zone Predictions @ 7Q10 Depth = .8562 ft Length = 134.49 ft Velocity = .7557 ft/sec Residence Time = .0021 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 30Q10 Depth = .9513 ft Length = 121.87 ft Velocity = .8021 ft/sec Residence Time = .0018 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 1Q10 Depth = .8179 ft Length = 140.32 ft Velocity = .7362 ft/sec Residence Time = .0529 hours</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.</p>
Virginia DEQ Mixing Zone Analysis Version 2.1	

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Critical Annual Flow Mixing Conditions	Critical Wet Season Flow Mixing Conditions
<p align="center"><u>Discharge Flow of 4.0 MGD</u></p> <p>Effluent Flow = 4.0 MGD Stream 7Q10 = 0.43 MGD Stream 30Q10 = 0.63 MGD Stream 1Q10 = 0.32 MGD Stream slope = 0.0025 ft/ft Stream width = 10 ft Bottom scale = 2 Channel scale = 1</p> <p>-----</p> <p>Mixing Zone Predictions @ 7Q10 Depth = .8885 ft Length = 129.91 ft Velocity = .7718 ft/sec Residence Time = .0019 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 30Q10 Depth = .914 ft Length = 126.53 ft Velocity = .7842 ft/sec Residence Time = .0019 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 1Q10 Depth = .8741 ft Length = 131.93 ft Velocity = .7648 ft/sec Residence Time = .0479 hours</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.</p>	<p align="center"><u>Discharge Flow of 4.0 MGD</u></p> <p>Effluent Flow = 4.0 MGD Stream 7Q10 = 1.18 MGD Stream 30Q10 = 1.93 MGD Stream 1Q10 = 0.89 MGD Stream slope = 0.0025 ft/ft Stream width = 11 ft Bottom scale = 2 Channel scale = 1</p> <p>-----</p> <p>Mixing Zone Predictions @ 7Q10 Depth = .9183 ft Length = 153.86 ft Velocity = .7938 ft/sec Residence Time = .0022 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 30Q10 Depth = 1.001 ft Length = 141.99 ft Velocity = .8336 ft/sec Residence Time = .002 days</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.</p> <p>-----</p> <p>Mixing Zone Predictions @ 1Q10 Depth = .8853 ft Length = 159.18 ft Velocity = .7773 ft/sec Residence Time = .0569 hours</p> <p>Recommendation: A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.</p>
Virginia DEQ Mixing Zone Analysis Version 2.1	

Fact Sheet – VPDES Permit No. VA0075191 – Parkins Mills WWTF

Critical Annual Flow Mixing Conditions	Critical Wet Season Flow Mixing Conditions
<i><u>Discharge Flow of 5.0 MGD</u></i>	<i><u>Discharge Flow of 5.0 MGD</u></i>
Effluent Flow = 5.0 MGD Stream 7Q10 = 0.43 MGD Stream 30Q10 = 0.63 MGD Stream 1Q10 = 0.32 MGD Stream slope = 0.0025 ft/ft Stream width = 11 ft Bottom scale = 2 Channel scale = 1	Effluent Flow = 5.0 MGD Stream 7Q10 = 1.18 MGD Stream 30Q10 = 1.93 MGD Stream 1Q10 = 0.89 MGD Stream slope = 0.0025 ft/ft Stream width = 12 ft Bottom scale = 2 Channel scale = 1
----- Mixing Zone Predictions @ 7Q10 Depth = .9463 ft Length = 149.63 ft Velocity = .8075 ft/sec Residence Time = .0021 days Recommendation: A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.	----- Mixing Zone Predictions @ 7Q10 Depth = .9669 ft Length = 176.01 ft Velocity = .8244 ft/sec Residence Time = .0025 days Recommendation: A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.
----- Mixing Zone Predictions @ 30Q10 Depth = .9683 ft Length = 146.46 ft Velocity = .8181 ft/sec Residence Time = .0021 days Recommendation: A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.	----- Mixing Zone Predictions @ 30Q10 Depth = 1.0402 ft Length = 164.45 ft Velocity = .8594 ft/sec Residence Time = .0022 days Recommendation: A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.
----- Mixing Zone Predictions @ 1Q10 Depth = .9335 ft Length = 151.6 ft Velocity = .8015 ft/sec Residence Time = .0525 hours Recommendation: A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.	----- Mixing Zone Predictions @ 1Q10 Depth = .9379 ft Length = 181.05 ft Velocity = .81 ft/sec Residence Time = .0621 hours Recommendation: A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.
Virginia DEQ Mixing Zone Analysis Version 2.1	

APPENDIX C

EFFLUENT SCREENING AND EFFLUENT LIMITATIONS

Effluent Limitations

A comparison of technology and water quality-based limits was performed, and the most stringent limits were selected. The selected limits are summarized in the table below.

Outfall 001		Final Limits				Design Flow: 2.0 MGD (Existing)	
PARAMETER	BASIS FOR LIMITS	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Avg.		Maximum		Frequency	Sample Type
Flow (MGD)	1	NL		NL		Continuous	T/I/R
-----	-----	Monthly Avg.		Weekly Avg.		-----	-----
CBOD ₅ (Jun – Nov)	3,5	8 mg/L	60 kg/d	11 mg/L	83 kg/d	5 Days/Week	24 HC
CBOD ₅ (Dec- May)	3,5	23 mg/L	170 kg/d	34 mg/L	260 kg/d	5 Days/Week	24 HC
TSS	2,6	30 mg/L	230 kg/d	45 mg/L	340 kg/d	1/Month	24 HC
Ammonia-N (Jun – Nov)	3	1.9 mg/L		2.4 mg/L		5 Days/Week	24 HC
Ammonia-N (Dec – May)	3	3.5 mg/L		4.5 mg/L		5 Days/Week	24 HC
Effluent Chlorine (TRC)*	3	0.0094 mg/L		0.012 mg/L		1/Day	Grab
Chloride	3	410 mg/L		410 mg/L		1/Month	24 HC
E. coli** (geometric mean)	3,6	126 N/100 mL		NA		3 Days/Week @ 48 hr intervals between 10 am – 4 pm	Grab
-----	-----	Minimum		Maximum		-----	-----
pH	3	6.5 S.U.		9.5 S.U.		1/Day	Grab
Contact Chlorine (TRC)*	3,4	1.0 mg/L		NA		4/Day @ 4 Hour	Grab
Dissolved Oxygen	3,5	7.1 mg/L		NA		1/Day	Grab
Whole Effluent Toxicity (TU _c)	3,4	N/A		1.75		1/Quarter	24 HC

NL = No Limitation, monitoring required
T/I/R = Totalizing, Indicating, and Recording equipment

NA = Not Applicable
24 HC = 24 Hour composite sample

- * Applicable only when chlorination is used for disinfection
** Applicable if an alternative to chlorination is used for disinfection.

Bases for Effluent Limitations

1. VPDES Permit Regulation (9 VAC 25-31-10 *et seq.*)
2. Federal Effluent Requirements (Secondary Treatment Regulation - 40CFR133)
3. Water Quality Standards (9 VAC 25-260-5 *et seq.*)
4. Best Professional Judgment (BPJ)
5. DO model presented in the Opequon Creek Capacity Study report dated March 2005 with all subsequent information and model runs.
6. Opequon Creek TMDL for bacteria and suspended solids; approved 1/31/05

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Outfall 001

Final Limit

Permitted Flow: 2.0 MGD (Expanded)

PARAMETER	BASIS FOR LIMITS	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Avg.		Maximum		Frequency	Sample Type
Flow (MGD)	1	NL		NL		Continuous	T/I/R
-----	-----	Monthly Avg.		Weekly Avg.		-----	-----
CBOD ₅ (Jun – Nov)	3,5	8 mg/L	60 kg/d	11 mg/L	83 kg/d	5 Days/Week	24 HC
CBOD ₅ (Dec- May)	3,5	23 mg/L	170 kg/d	34 mg/L	260 kg/d	5 Days/Week	24 HC
TSS	2,6	30 mg/L	230 kg/d	45 mg/L	340 kg/d	1/Month	24 HC
Ammonia-N (Jun – Nov)	3	2.3 mg/L		2.9 mg/L		5 Days/Week	24 HC
Ammonia-N (Dec – May)	3	4.4 mg/L		5.5 mg/L		5 Days/Week	24 HC
Effluent Chlorine (TRC)*	3	0.0094 mg/L		0.012 mg/L		1/Day	Grab
Chloride	3	410 mg/L		410 mg/L		1/Month	24 HC
E. coli** (geometric mean)	3,6	126 N/100 mL		NA		3 Days/Week @ 48 hr intervals between 10 am – 4 pm	Grab
Total Phosphorus (TP)	7	NL (mg/L)		NA		1/Week	24 HC
Orthophosphate	7	NL (mg/L)		NA		1/Week	24 HC
TKN (as N)	7	NL (mg/L)		NA		1/Week	24 HC
Nitrate-Nitrite (as N)	7	NL (mg/L)		NA		1/Week	24 HC
Total Nitrogen (TN)	7	NL (mg/L)		NA		1/Week	Calculated
-----	-----	Yearly Average		Maximum		-----	-----
TP – Year to Date	7	NL (mg/L)		NA		1/Month	Calculated
TP – Calendar Year	7	0.3 mg/L		NA		1/Year	Calculated
TN – Year to Date	7	NL (mg/L)		NA		1/Month	Calculated
TN – Calendar Year	7	4.0 mg/L		NA		1/Year	Calculated
-----	-----	Minimum		Maximum		-----	-----
pH	3	6.5 S.U.		9.5 S.U.		1/Day	Grab
Contact Chlorine (TRC)*	3,4	1.0 mg/L		NA		4/Day @ 4 Hour Intervals	Grab
Dissolved Oxygen	3,5	7.1 mg/L		NA		1/Day	Grab
Whole Effluent Toxicity (TU _c)	3,4	N/A		1.75		1/Quarter	24 HC

NL = No Limitation, monitoring required

T/I/R = Totalizing, Indicating, and Recording equipment

NA = Not Applicable

24 HC = 24 Hour composite sample

** Applicable if an alternative to chlorination is used for disinfection.

* Applicable only when chlorination is used for disinfection

Bases for Effluent Limitations

1. VPDES Permit Regulation (9 VAC 25-31-10 *et seq.*)
2. Federal Effluent Requirements (Secondary Treatment Regulation - 40CFR133)
3. Water Quality Standards (9 VAC 25-260-5 *et seq.*)
4. Best Professional Judgment (BPJ)
5. DO model presented in the Opequon Creek Capacity Study report dated March 2005 with all subsequent information and model runs
6. Opequon Creek TMDL for bacteria and suspended solids; approved 1/31/05
7. Guidance Memo No. 07-2008, Amendment No. 2, Permitting Considerations for Facilities in the Chesapeake Bay Watershed

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Outfall 001

Final Limits

Permitted Flow: 3.0 MGD (Expanded)

PARAMETER	BASIS FOR LIMITS	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Avg.		Maximum		Frequency	Sample Type
Flow (MGD)	1	NL		NL		Continuous	T/I/R
-----	-----	Monthly Avg.		Weekly Avg.		-----	-----
CBOD ₅	3,5	8 mg/L	80 kg/d	11 mg/L	130 kg/d	1/Day	24 HC
TSS	6	21 mg/L	238 kg/d	32 mg/L	360 kg/d	1/Week	24 HC
Ammonia-N (Jun – Nov)	3	2.1 mg/L		2.6 mg/L		1/Day	24 HC
Ammonia-N (Dec – May)	3	3.7 mg/L		4.6 mg/L		1/Day	24 HC
Effluent Chlorine (TRC)*	3	0.0094 mg/L		0.012 mg/L		1/Day	Grab
Chloride	3	380 mg/L		380 mg/L		1/Month	24 HC
E. coli** (geometric mean)	3,6	126 N/100 mL		NA		3 Days/Week @ 48 hr intervals between 10 am – 4 pm	Grab
Total Phosphorus (TP)	7	NL (mg/L)		NA		1/Week	24 HC
Orthophosphate	7	NL (mg/L)		NA		1/Week	24 HC
TKN (as N)	7	NL (mg/L)		NA		1/Week	24 HC
Nitrate-Nitrite (as N)	7	NL (mg/L)		NA		1/Week	24 HC
Total Nitrogen (TN)	7	NL (mg/L)		NA		1/Week	Calculated
-----	-----	Yearly Average		Maximum		-----	-----
TP – Year to Date	7	NL (mg/L)		NA		1/Month	Calculated
TP – Calendar Year	7	0.3 mg/L		NA		1/Year	Calculated
TN – Year to Date	7	NL (mg/L)		NA		1/Month	Calculated
TN – Calendar Year	7	4.0 mg/L		NA		1/Year	Calculated
-----	-----	Minimum		Maximum		-----	-----
pH	3	6.5 S.U.		9.5 S.U.		1/Day	Grab
Contact Chlorine (TRC)*	3,4	1.0 mg/L		NA		1/2 Hour	Grab
Dissolved Oxygen	3,5	7.1 mg/L		NA		1/Day	Grab
Whole Effluent Toxicity (TU _c)	3,4	N/A		1.67		1/Quarter	24 HC

NL = No Limitation, monitoring required

NA = Not Applicable

T/I/R = Totalizing, Indicating, and Recording equipment

24 HC = 24 Hour composite sample

** Applicable if an alternative to chlorination is used for disinfection.

* Applicable only when chlorination is used for disinfection

Bases for Effluent Limitations

1. VPDES Permit Regulation (9 VAC 25-31-10 *et seq.*)
2. Federal Effluent Requirements (Secondary Treatment Regulation - 40CFR133)
3. Water Quality Standards (9 VAC 25-260-5 *et seq.*)
4. Best Professional Judgment (BPJ)
5. DO model presented in the Opequon Creek Capacity Study report dated March 2005 with all subsequent information and model runs
6. Opequon Creek TMDL for bacteria and suspended solids; approved 1/31/05
7. Guidance Memo No. 07-2008, Amendment No. 2, Permitting Considerations for Facilities in the Chesapeake Bay Watershed

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Outfall 001

Final Limit

Permitted Flow: 4.0 MGD (Expanded)

PARAMETER	BASIS FOR LIMITS	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Avg.		Maximum		Frequency	Sample Type
Flow (MGD)	1	NL		NL		Continuous	T/I/R
-----	-----	Monthly Avg.		Weekly Avg.		-----	-----
CBOD ₅	3,5	8 mg/L	110 kg/d	11 mg/L	170 kg/d	1/Day	24 HC
TSS	6	16 mg/L	238 kg/d	24 mg/L	360 kg/d	1/Week	24 HC
Ammonia-N (Jun – Nov)	3	2.0 mg/L		2.5 mg/L		1/Day	24 HC
Ammonia-N (Dec – May)	3	3.4 mg/L		4.2 mg/L		1/Day	24 HC
Effluent Chlorine (TRC)*	3	0.0087 mg/L		0.011 mg/L		1/Day	Grab
Chloride	3	360 mg/L		360 mg/L		1/Month	24 HC
E. coli** (geometric mean)	3,6	126 N/100 mL		NA		3 Days/Week @ 48 hr intervals between 10 am – 4 pm	Grab
Total Phosphorus (TP)	7	NL (mg/L)		NA		1/Week	24 HC
Orthophosphate	7	NL (mg/L)		NA		1/Week	24 HC
TKN (as N)	7	NL (mg/L)		NA		1/Week	24 HC
Nitrate-Nitrite (as N)	7	NL (mg/L)		NA		1/Week	24 HC
Total Nitrogen (TN)	7	NL (mg/L)		NA		1/Week	Calculated
-----	-----	Yearly Average		Maximum		-----	-----
TP – Year to Date	7	NL (mg/L)		NA		1/Month	Calculated
TP – Calendar Year	7	0.3 mg/L		NA		1/Year	Calculated
TN – Year to Date	7	NL (mg/L)		NA		1/Month	Calculated
TN – Calendar Year	7	4.0 mg/L		NA		1/Year	Calculated
-----	-----	Minimum		Maximum		-----	-----
pH	3	6.5 S.U.		9.5 S.U.		1/Day	Grab
Contact Chlorine (TRC)*	3,4	1.0 mg/L		NA		1/2 Hour	Grab
Dissolved Oxygen	3,5	7.1 mg/L		NA		1/Day	Grab
Whole Effluent Toxicity (TU _c)	3,4	N/A		1.61		1/Quarter	24 HC

NL = No Limitation, monitoring required

NA = Not Applicable

T/I/R = Totalizing, Indicating, and Recording equipment

24 HC = 24 Hour composite sample

** Applicable if an alternative to chlorination is used for disinfection.

* Applicable only when chlorination is used for disinfection

Bases for Effluent Limitations

1. VPDES Permit Regulation (9 VAC 25-31-10 *et seq.*)
2. Federal Effluent Requirements (Secondary Treatment Regulation - 40CFR133)
3. Water Quality Standards (9 VAC 25-260-5 *et seq.*)
4. Best Professional Judgment (BPJ)
5. DO model presented in the Opequon Creek Capacity Study report dated March 2005 with all subsequent information and model runs
6. Opequon Creek TMDL for bacteria and suspended solids. Approved 1/31/05.
7. Guidance Memo No. 07-2008, Amendment No. 2, Permitting Considerations for Facilities in the Chesapeake Bay Watershed

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Outfall 001

Final Limits

Design Flow: 5.0 MGD (Expanded)

PARAMETER	BASIS FOR LIMITS	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Avg.		Maximum		Frequency	Sample Type
Flow (MGD)	1	NL		NL		Continuous	T/I/R
-----	-----	Monthly Avg.		Weekly Avg.		-----	-----
CBOD ₅	3,5	8 mg/L	140 kg/d	11 mg/L	210 kg/d	1/Day	24 HC
TSS	6	13 mg/L	238 kg/d	19 mg/L	360 kg/d	1/Week	24 HC
Ammonia-N (Jun – Nov)	3	2.0 mg/L		2.5 mg/L		1/Day	24 HC
Ammonia-N (Dec – May)	3	3.3 mg/L		4.1 mg/L		1/Day	24 HC
Effluent Chlorine (TRC)*	3	0.0087 mg/L		0.011 mg/L		1/Day	Grab
Chloride	3	360 mg/L		360 mg/L		1/Month	24 HC
E. coli** (geometric mean)	3,6	126 N/100 mL		NA		3 Days/Week @ 48 hr intervals between 10 am – 4 pm	Grab
Total Phosphorus (TP)	7	NL (mg/L)		NA		1/Week	24 HC
Orthophosphate	7	NL (mg/L)		NA		1/Week	24 HC
TKN (as N)	7	NL (mg/L)		NA		1/Week	24 HC
Nitrate-Nitrite (as N)	7	NL (mg/L)		NA		1/Week	24 HC
Total Nitrogen (TN)	7	NL (mg/L)		NA		1/Week	Calculated
-----	-----	Yearly Average		Maximum		-----	-----
TP – Year to Date	7	NL (mg/L)		NA		1/Month	Calculated
TP – Calendar Year	7	0.3 mg/L		NA		1/Year	Calculated
TN – Year to Date	7	NL (mg/L)		NA		1/Month	Calculated
TN – Calendar Year	7	4.0 mg/L		NA		1/Year	Calculated
-----		Minimum		Maximum		-----	-----
pH	3	6.5 S.U.		9.5 S.U.		1/Day	Grab
Contact Chlorine (TRC)*	3,4	1.0 mg/L		NA		1/2 Hour	Grab
Dissolved Oxygen	3,5	7.1 mg/L		NA		1/Day	Grab
Whole Effluent Toxicity (TU _c)	3,4	N/A		1.59		1/Quarter	24 HC

NL = No Limitation, monitoring required

NA = Not Applicable

T/I/R = Totalizing, Indicating, and Recording equipment

24 HC = 24 Hour composite sample

** Applicable if an alternative to chlorination is used for disinfection.

* Applicable only when chlorination is used for disinfection

Bases for Effluent Limitations

1. VPDES Permit Regulation (9 VAC 25-31-10 *et seq.*)
2. Federal Effluent Requirements (Secondary Treatment Regulation - 40CFR133)
3. Water Quality Standards (9 VAC 25-260-5 *et seq.*)
4. Best Professional Judgment (BPJ)
5. DO model presented in the Opequon Creek Capacity Study report dated March 2005 with all subsequent information and model runs
6. Opequon Creek TMDL for bacteria and suspended solids. Approved 1/31/05.
7. Guidance Memo No. 07-2008, Amendment No. 2, Permitting Considerations for Facilities in the Chesapeake Bay Watershed

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Limiting Factors – Overview:

The following potential limiting factors have been considered in developing this permit and fact sheet:

Water Quality Management Plan Regulation (9 VAC 25-720-50 Potomac, Shenandoah River Basin)	
A. TMDL limits	TSS, E. coli
B. Non-TMDL WLAs	None
C. CBP WLAs	Total Nitrogen, Total Phosphorus by coverage under VAN010057
Federal Effluent Guidelines	CBOD₅, TSS, pH
BPJ/Agency Guidance limits	TRC (contact), TN, TP
Water Quality-based Limits - numeric	CBOD₅, DO, Ammonia-N, TRC (effluent), E. coli, pH, Chloride, WET
Water Quality-based Limits - narrative	None
Toxics Management Plan (TMP)	WET
Storm Water Limits	None

EVALUATION OF THE EFFLUENT – CONVENTIONAL POLLUTANTS: 2.0 MGD (Existing)

CBOD₅ was evaluated based on the March 2005 Opequon Creek Capacity Study (OCCS). The OCCS report and model runs are included in this appendix. The flow model was prepared in conjunction with the 2005 permit modification by the owner's consultant, and includes the Parkins Mills WWTF, Frederick County Landfill and Opequon Water Reclamation Facility discharges. The model assumptions, inputs, and outputs were reviewed at this reissuance and are characteristic of the current discharge and stream conditions. The model outputs demonstrate downstream Water Quality Standards will be protected. As such, the model CBOD₅ inputs were carried forward and applied to the permit as monthly average effluent limitations. The CBOD₅ model inputs were rounded from 7.5 mg/L to 8 mg/L based on DEQ rounding guidance. The monthly average loadings and the maximum weekly average concentrations were all conservatively calculated based on a monthly average CBOD₅ concentration of 7.5 mg/L. The maximum weekly average loadings were then set based on the rounded maximum weekly average concentrations.

NOTE: Per the owner's modeling consultant, HydroQual, Inc., all model report and data references to BOD are to be interpreted as CBOD. NBOD is evaluated based on Org-N and Ammonia-N. Also, per DEQ guidance, the wet season flow tiers modeled as part of the 2005 permit modification (3.0 MGD, 4.3 MGD, 5.6 MGD, and 7.6 MGD) are no longer appropriate for inclusion in the permit and have been removed. If necessary, the owner may submit a Plan of Action to DEQ to address seasonally high influent flows resulting from sewer collection system I&I.

The NH₃-N WLAc values determined at this reissuance are slightly more than half the TKN effluent values used in the 2005 flow model. Per DEQ guidance, without additional flow model data based on a TKN load greater than twice the NH₃-N WLAc value, the TKN values previously modeled must be applied as permit limitations. The TKN effluent concentration modeled in 2005 is more than twice the previous NH₃-N WLAc. Because the facility has reliably maintained compliance with their existing NH₃-N limitations these limits have been carried forward in lieu of adding TKN limits with 5 Days/Week monitoring in the permit. The permittee is required to monitor for TKN 1/Week per their coverage under the Nutrient GP.

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The TSS limits are consistent with the Secondary Treatment Regulation and have been carried forward from the previous permit. Per the approved TMDL for Opequon Creek, the Parkins Mills WWTF is restricted to an annual TSS discharge of 87.04 metric tons per year. At 2.0 MGD, the TMDL based limits are less stringent than the minimum Federal Effluent Guideline requirements for Secondary Treatment.

The pH limits reflect the current Water Quality Standard for pH in the receiving stream and have been carried forward from the previous permit.

EVALUATION OF THE EFFLUENT – DISINFECTION: 2.0 MGD (Existing)

The E. coli limits have been carried forward from the previous permit. These limits reflect the current Water Quality Standard for E. coli in the receiving stream and meet the requirements included in the approved TMDL for Opequon Creek.

EVALUATION OF THE EFFLUENT – NUTRIENTS: 2.0 MGD (Existing)

In accordance with § 62.1-44.19:14.C.5. of the Code of Virginia, this Significant Discharger has submitted a Registration Statement and DEQ has recognized that they are covered under the General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia (9 VAC 25-820-10 *et seq.*). The effective date of coverage is January 1, 2007. Coverage under the General Permit will expire December 31, 2011. The permittee will need to submit a new Registration Statement prior to the GP expiration in order to maintain coverage.

The load limit for Total Nitrogen (TN) is 60,911 pounds per calendar year (lbs/yr) and Total Phosphorus (TP) is 4,568 lbs/yr. These mass or load limits are established in 9 VAC 25-720-70.C based on a design flow of 5.0 MGD. If the WWTF is not certified to operate at 5.0 MGD design flow capacity by 12/31/10, the WLAs will decrease to TN = 36,547 lbs/yr and TP = 2,741 lbs/yr, based on a design flow capacity of 3.0 MGD.

Annual nutrient concentration limitations are not required for the existing facility. Concentration limitations are included in the expanded permit flow tiers and are applicable following CTO issuance for the expanded facility.

EVALUATION OF THE EFFLUENT – TOXIC POLLUTANTS: 2.0 MGD (Existing)

Input parameters for instream water quality criteria (WQC) and waste load allocations (WLA)

Stream: Water quality data for the receiving stream was obtained from Ambient Monitoring Stations No. 1AOPE036.13 on Opequon Creek at the Rte 655 Bridge. Toxic substances, including Ammonia-N and Total Recoverable Chlorine, are assumed absent in the receiving stream because there are no data to indicate their presence immediately upstream of the discharge.

Stream Parameter	Value	Units
Mean Hardness (as CaCO ₃) =	235	mg/L
90 th Percentile Temperature (Annual) =	22.1	°C
90 th Percentile Temperature (Wet season*) =	15.8	°C
90 th Percentile Maximum pH =	8.5	SU
10 th Percentile Maximum pH =	7.8	SU

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Effluent: The pH and temperature values were obtained from the daily operational data submitted by the permittee. The hardness value was obtained from monitoring data submitted by the permittee.

Effluent Parameter	Value	Units
Mean Hardness (as CaCO ₃) =	254	mg/L
90 th Percentile Temperature (Annual) =	25	°C
90 th Percentile Temperature (Wet season*) =	20	°C
90 th Percentile Maximum pH =	7.7	SU
10 th Percentile Maximum pH =	7.3	SU

* Wet Season = December through May

Water Quality Standards (WQSs) and Waste Load Allocations (WLAs) were calculated for the WQS parameters for which data is available. Those WQSs and WLAs are presented in this appendix. Current agency guidelines recommends the evaluation of toxic pollutant limits for total residual chlorine (TRC) and Ammonia-N based on default effluent concentrations of 20 mg/L and 9 mg/L, respectively. The effluent data were analyzed per the protocol for evaluation of effluent toxic pollutants included in this appendix with the following results:

- ? Total Residual Chlorine (TRC): TRC monthly and maximum weekly average limits are required for this discharge. The monthly average limit has been adjusted from the previous limit based on current DEQ guidance that requires the limit be expressed using two significant figures.
- ? Ammonia-N: Ammonia-N monthly and maximum weekly average seasonal limits are required for this discharge. In lieu of applying the less stringent Ammonia-N limits determined at this reissuance and adding TKN limits to the permit, the previous Ammonia-N seasonal limits were carried forward.
- ? Chloride: TRC monthly and maximum weekly average limits are required for this discharge. These limits were determined necessary at this reissuance based on the Attachment A monitoring data submitted by the permittee. A schedule of compliance for meeting the new limits is included in the permit.
- ? Beta Particle & Photon Activity: The effluent data submitted by the permittee suggests the Beta Particle & Photon Activity associated with the discharge is acceptable. 50 pCi/L or less Beta Particle & Photon Activity is generally considered non-hazardous. There is currently no laboratory test available to directly measure the effluent mrem/yr exposure value of Beta Particle & Photon Activity. This unit of measurement must be logged using a radiation exposure badge.

Additional monitoring data is needed for hydrogen sulfide due to the lack of effluent quality data. The permittee must monitor the effluent at outfall 001 for hydrogen sulfide as noted in Attachment A of the permit once within one year from the permit's effective date.

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PROTOCOL FOR THE EVALUATION OF THE EFFLUENT – TOXIC POLLUTANTS: ALL FLOW TIERS

Toxic pollutants were evaluated in accordance with OWP Guidance Memo No. 00-2011 (8/24/00). Acute and Chronic Waste Load Allocations (WLA_a and WLA_c) were analyzed according to the protocol below using a statistical approach (STAT.exe) to determine the necessity and magnitude of limits. Human Health Waste Load Allocations (WLA_{hh}) were analyzed according to the same protocol through a simple comparison with the effluent data. If the WLA_{hh} exceeded the effluent datum or data mean, no limits were required. If the effluent datum or data mean exceeded the WLA_{hh} , the WLA_{hh} was imposed as the limit.

Since there are no data available for any toxic pollutants immediately upstream of this discharge, all upstream (background) pollutant concentrations are assumed to be "0".

The steps used in evaluating the effluent data are as follows:

- A. If all data are reported as "below detection" or < the required Quantification Level (QL), and at least one detection level is = the required QL, then the pollutant is considered to be not significantly present in the discharge and no further monitoring is required.
- B. If all data are reported as "below detection", and all detection levels are > the required QL, then an evaluation is performed in which the pollutant is assumed present at the lowest reported detection level.
 - B.1. If the evaluation indicates that no limits are needed, then the existing data set is adequate and no further monitoring is required.
 - B.2. If the evaluation indicates that limits are needed, then the existing data set is inadequate to make a determination and additional monitoring is required.
- C. If any data value is reported as detectable at or above the required QL, then the data are adequate to determine whether effluent limits are needed.
 - C.1. If the evaluation indicates that no limits are needed, then no further monitoring is required.
 - C.2. If the evaluation indicates that limits are needed, then the limits and associated requirements are specified in the draft permit.
 - C.3. (Exception for Metals data only) If the evaluation indicates that limits are needed, but the data are reported as a form other than "Dissolved", then the existing data set is inadequate to make a determination and additional monitoring is required.

TOXLARGE: 2.0 MGD (Existing)

Parameter	CASRN	Type	QL (µg/L)	Data (µg/L unless noted otherwise)	Source of Data	Data Eval
Acenaphthene	83-32-9	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Acrolein	107-02-8	V	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Acrylonitrile ^C	107-13-1	V	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Aldrin ^C	309-00-2	P	0.05	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Ammonia-N (mg/L)	766-41-7	X	0.2 mg/L	Default = 9 mg/L	b	C.2

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Parameter	CASRN	Type	QL (µg/L)	Data (µg/L unless noted otherwise)	Source of Data	Data Eval
Anthracene	120-12-7	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Antimony	7440-36-0	M	0.2	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Arsenic	7440-38-2	M	1.0	<0.5	a	A
Barium	7440-39-3	M	---	Applicable to PWS waters only	---	---
Benzene ^C	71-43-2	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Benzidine ^C	92-87-5	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Benzo (a) anthracene ^C	56-55-3	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Benzo (b) fluoranthene ^C	205-99-2	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Benzo (k) fluoranthene ^C	207-08-9	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Benzo (a) pyrene ^C	50-32-8	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Bis2-Chloroethyl Ether	111-44-4	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Bis2-Chloroisopropyl Ether	39638-32-9	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Bromoform ^C	75-25-2	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Butylbenzylphthalate	85-68-7	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Cadmium	7440-43-9	M	0.3	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Carbon Tetrachloride ^C	56-23-5	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Chlordane ^C	57-74-9	P	0.2	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Chloride (mg/L)	16887-00-6	X	---	355 (max sample value)	a	C.2
TRC (mg/L)	7782-50-5	X	0.1 mg/L	Default = 20 mg/L	b	C.2
Chlorobenzene (synonym = Monochlorobenzene)	108-90-7	V	50	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Chlorodibromomethane ^C	124-48-1	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Chloroform ^C	67-66-3	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
2-Chloronaphthalene	91-58-7	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
2-Chlorophenol	95-57-8	A	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Chlorpyrifos (synonym = Dursban)	2921-88-2	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Chromium III	16065-83-1	M	0.5	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Chromium VI	18540-29-9	M	0.5	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Chromium, Total	7440-47-3	M	---	Applicable to PWS waters only	---	---
Chrysene ^C	218-01-9	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Copper	7440-50-8	M	0.5	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Cyanide	57-12-5	X	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
DDD ^C	72-54-8	P	0.1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
DDE ^C	72-55-9	P	0.1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
DDT ^C	50-29-3	P	0.1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Demeton	8065-48-3	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Dibenz(a,h)anthracene ^C	53-70-3	B	20	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Dibutyl phthalate (syn. = Di-n-Butyl Phthalate)	84-74-2	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Dichloromethane (syn. = Methylene Chloride) ^C	75-09-2	V	20	Prior evaluation on file. No monitoring req'd. for this action.	---	---
1,2-Dichlorobenzene	95-50-1	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
1,3-Dichlorobenzene	541-73-1	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
1,4-Dichlorobenzene	106-46-7	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
3,3-Dichlorobenzidine ^C	91-94-1	B	---	<5	a	A

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Parameter	CASRN	Type	QL (µg/L)	Data (µg/L unless noted otherwise)	Source of Data	Data Eval
Dichlorobromomethane ^C	75-27-4	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
1,2-Dichloroethane ^C	107-06-2	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
1,1-Dichloroethylene	75-35-4	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
1,2-trans-dichloroethylene	156-60-5	V	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
2,4-Dichlorophenol	120-83-2	A	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
2,4-Dichlorophenoxy acetic acid (syn. = 2,4-D)	94-75-7	P	---	Applicable to PWS waters only	---	---
1,2-Dichloropropane ^C	78-87-5	V	---	<5	a	A
1,3-Dichloropropene	542-75-6	V	---	<10	a	A
Dieldrin ^C	60-57-1	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Diethyl Phthalate	84-66-2	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Di-2-Ethylhexyl Phthalate ^C	117-81-7	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
2,4-Dimethylphenol	105-67-9	A	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Dimethyl Phthalate	131-11-3	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
2,4 Dinitrophenol	51-28-5	A	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
2-Methyl-4,6-Dinitrophenol	534-52-1	A	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
2,4-Dinitrotoluene ^C	121-14-2	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	1746-01-6	X	0.00001	Prior evaluation on file. No monitoring req'd. for this action.	---	---
1,2-Diphenylhydrazine ^C	122-66-7	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Alpha-Endosulfan (I)	959-98-8	P	---	<0.05	a	A
Beta-Endosulfan (II)	33213-65-9	P	---	<0.05	a	A
Endosulfan Sulfate	1031-07-8	P	---	<0.05	a	A
Endrin	72-20-8	P	0.1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Endrin Aldehyde	7421-93-4	P	---	<0.05	a	A
Ethylbenzene	100-41-4	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Fluoranthene	206-44-0	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Fluorene	86-73-7	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Foaming Agents		X	---	Applicable to PWS waters only	---	---
Guthion	86-50-0	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Heptachlor ^C	76-44-8	P	0.05	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Heptachlor Epoxide ^C	1024-57-3	P	---	<0.5	a	A
Hexachlorobenzene ^C	118-74-1	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Hexachlorobutadiene ^C	87-68-3	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Hexachlorocyclohexane Alpha-BHC ^C	319-84-6	P	---	<0.5	a	A
Hexachlorocyclohexane Beta-BHC ^C	319-85-7	P	---	<0.5	a	A
Hexachlorocyclohexane Gamma-BHC ^C (syn. = Lindane)	58-89-9	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Hexachlorocyclopentadiene	77-47-4	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Hexachloroethane ^C	67-72-1	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Hydrogen Sulfide	7783-06-4	X	---	No data, monitoring required.	---	---
Indeno (1,2,3-cd) pyrene ^C	193-39-5	B	20	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Iron	7439-89-6	M	1.0	Applicable to PWS waters only	---	---
Isophorone ^C	78-59-1	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---

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Parameter	CASRN	Type	QL (µg/L)	Data (µg/L unless noted otherwise)	Source of Data	Data Eval
Kepone	143-50-0	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Lead	7439-92-1	M	0.5	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Malathion	121-75-5	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Manganese	7439-96-5	M	0.2	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Mercury	7439-97-6	M	1.0	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Methyl Bromide	74-83-9	V	---	<5	a	A
Methoxychlor	72-43-5	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Mirex	2385-85-5	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Nickel	7440-02-0	M	0.5	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Nitrate (as N)	14797-55-8	X	---	Applicable to PWS waters only	---	---
Nitrobenzene	98-95-3	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
N-Nitrosodimethylamine ^C	62-75-9	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
N-Nitrosodiphenylamine ^C	86-30-6	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
N-Nitrosodi-n-propylamine ^C	621-64-7	B	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Parathion	56-38-2	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
PCB-1016	12674-11-2	p	1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
PCB-1221	11104-28-2	p	1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
PCB-1232	11141-16-5	p	1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
PCB-1242	53469-21-9	p	1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
PCB-1248	12672-29-6	p	1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
PCB-1254	11097-69-1	p	1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
PCB-1260	11096-82-5	p	1	Prior evaluation on file. No monitoring req'd. for this action.	---	---
PCB Total ^C	1336-36-3	p	---	<7	a	A
Pentachlorophenol ^C	87-86-5	A	50	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Phenol	108-95-2	A	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Pyrene	129-00-0	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Gross Alpha Particle Activity (pCi/L)		R	---	<5	a	A
Beta Particle & Photon Activity (mrem/yr)		R	---	17.3 pCi/L	a	C.1
Strontium-90 (pCi/L)		R	---	<2	a	A
Tritium (pCi/L)		R	---	<700	a	A
Selenium	7782-49-2	M	2.0	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Silver	7440-22-4	M	0.2	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Sulfate	14808-79-8	X	---	Applicable to PWS waters only	---	---
1,1,2,2-Tetrachloroethane ^C	79-34-5	V	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Tetrachloroethylene ^C	127-18-4	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Thallium	7440-28-0	M	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Toluene	10-88-3	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Total dissolved solids		X	---	Applicable to PWS waters only	---	---
Toxaphene ^C	8001-35-2	P	5.0	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Tributyltin	60-10-5	P	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---
1,2,4-Trichlorobenzene	120-82-1	B	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
1,1,2-Trichloroethane ^C	79-00-5	V	---	Prior evaluation on file. No monitoring req'd. for this action.	---	---

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Parameter	CASRN	Type	QL (µg/L)	Data (µg/L unless noted otherwise)	Source of Data	Data Eval
Trichloroethylene ^C	79-01-6	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
2,4,6-Trichlorophenol ^C	88-06-2	A	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
2-(2,4,5-Trichlorophenoxy) propionic acid (synonym = Silvex)	93-72-1	P	---	Applicable to PWS waters only	---	---
Vinyl Chloride ^C	75-01-4	V	10	Prior evaluation on file. No monitoring req'd. for this action.	---	---
Zinc	7440-66-6	M	2.0	Prior evaluation on file. No monitoring req'd. for this action.	---	---

"Type" column indicates a category assigned to the referenced substance (see below):

A = Acid Extractable Organic Compounds

B = Base/Neutral Extractable Organic Compounds

M = Metals

p = PCBs

P = Pesticides

V = Volatile Organic Compounds

X = Miscellaneous Compounds and Parameters

"Source of Data" codes:

a = Permittee monitoring

b = Agency default values per GM 00-2011

"Data Evaluation" codes:

See section titled "EVALUATION OF EFFLUENT TOXIC POLLUTANTS" (preceding the parameter table) for an explanation of the code used.

The superscript "C" following the parameter name indicates that the substance is a known or suspected carcinogen; human health criteria at risk level 10⁻⁵.

CASRN = Chemical Abstract Service Registry Number for each parameter is referenced in the current Water Quality Standards. A unique numeric identifier designating only one substance. The Chemical Abstract Service is a division of the American Chemical Society.

WQS-WLA SPREADSHEET INPUT: 2.0 MGD (Existing & Expanded)

WATER QUALITY CRITERIA / WASTE LOAD ALLOCATION ANALYSIS

Facility Name:

Parkins Mills WWTF

Receiving Stream:

Opequon Creek

Permit No.: VA0075191

Date: 11/29/2007

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO₃) = 235 mg/L
 90% Temperature (Annual) = 22.1 deg C
 90% Temperature (Wet season) = 15.8 deg C
 90% Maximum pH = 8.5 SU
 10% Maximum pH = 7.8 SU
 Tier Designation = 1
 Public Water Supply (PWS) Y/N? = N
 V(alley) or P(iedmont)? = V
 Trout Present Y/N? = N
 Early Life Stages Present Y/N? = Y

Stream Flows

1Q10 (Annual) = 0.32 MGD
 7Q10 (Annual) = 0.43 MGD
 30Q10 (Annual) = 0.63 MGD
 1Q10 (Wet season) = 0.89 MGD
 30Q10 (Wet season) = 1.93 MGD
 30Q5 = 0.89 MGD
 Harmonic Mean = 2.94 MGD
 Annual Average = 12.3 MGD

Mixing Information

Annual - 1Q10 Flow = 100 %
 - 7Q10 Flow = 100 %
 - 30Q10 Flow = 100 %
 Wet Season - 1Q10 Flow = 100 %
 - 30Q10 Flow = 100 %

Effluent Information

Mean Hardness (as CaCO₃) = 254 mg/L
 90% Temp (Annual) = 25 deg C
 90% Temp (Wet season) = 20 deg C
 90% Maximum pH = 7.7 SU
 10% Maximum pH = 7.3 SU
 Current Discharge Flow = 2,000 MGD
 Discharge Flow for Limit Analysis = 2,000 MGD

Footnotes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise.
- All flow values are expressed as Million Gallons per Day (MGD).
- Discharge volumes are highest monthly average or 2C maximum for Industries and design flows for Municipals.
- Hardness expressed as mg/l CaCO₃. Standards calculated using Hardness values in the range of 25-400 mg/l CaCO₃.
- "Public Water Supply" protects for fish & water consumption. "Other Surface Waters" protects for fish consumption only.
- Carcinogen "Y" indicates carcinogenic parameter.
- Ammonia WQSs selected from separate tables, based on pH and temperature.
- Metals measured as Dissolved, unless specified otherwise.
- WLA = Waste Load Allocation (based on standards).

- WLA = Waste Load Allocation (based on standards).
- WLAs are based on mass balances (less background, if data exist).
- Acute - 1 hour avg. concentration not to be exceeded more than 1/3 years.
- Chronic - 4 day avg. concentration (30 day avg. for Ammonia) not to be exceeded more than 1/3 years.
- Mass balances employ 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Actual flows employed are a function of the mixing analysis and may be less than the actual critical flows.
- Effluent Limitations are calculated elsewhere using the minimum WLA and EPA's statistical approach (Technical Support Document).

WOS-WLA SPREADSHEET OUTPUT: 2.0 MGD (Existing & Expanded)

STAT.exe RESULTS: 2.0 MGD (Existing & Expanded)

The data are: 9

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Chemical = Chloride
Chronic averaging period = 4
WLAa = 1000
WLAc = 280
Q.L. = 1.0
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 355
Variance = 45369
C.V. = 0.6
97th percentile daily values = 863.863
97th percentile 4 day average = 590.645
97th percentile 30 day average = 428.148
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 409.520939534905
Average Weekly limit = 409.520939534905
Average Monthly Limit = 409.520939534905

The data are: 355

Chemical = Ammonia-N, 97% -tile Effluent Conc.
Chronic averaging period = 30
WLAa = 11
WLAc = 1.8
Q.L. = 0.2
samples/mo. = 20
samples/wk. = 5

Summary of Statistics:

observations = 1
Expected Value = 1.49
Variance = .799236
C.V. = 0.6
97th percentile daily values = 3.6
97th percentile 4 day average = 2.5
97th percentile 30 day average = 1.8
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are: 1.49

Chemical = TRC
Chronic averaging period = 4
WLAa = 0.022
WLAc = 0.013
Q.L. = 0.1
samples/mo. = 30
samples/wk. = 7

Summary of Statistics:

observations = 1
Expected Value = 20
Variance = 144
C.V. = 0.6
97th percentile daily values = 48.6683
97th percentile 4 day average = 33.2758
97th percentile 30 day average = 24.1210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 0.019013472192692
Average Weekly limit = 1.16116644934563E-02
Average Monthly Limit = 9.42347921730776E-03

The data are: 20

Chemical = Chloride 97th %-tile Effluent Conc.
Chronic averaging period = 4
WLAa = 0
WLAc = 0
Q.L. = 1.0
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 198
Variance = 14113.4
C.V. = 0.6
97th percentile daily values = 481.816
97th percentile 4 day average = 329.430
97th percentile 30 day average = 238.798
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are: 198

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EVALUATION OF THE EFFLUENT – CONVENTIONAL POLLUTANTS: 2.0 MGD (Expanded) – 5.0 MGD

CBOD₅ and DO were evaluated based on the OCCS flow model requirements. The model predicted CBOD₅ limits were determined to be protective of downstream Water Quality Standards (see the 2.0 MGD (Existing) evaluation for additional information).

The permittee is required to monitor for TKN 1/Week. Because this facility is required to achieve a TN concentration of 4.0 mg/L at the expanded discharge conditions, TKN will be sufficiently low to protect downstream DO WQS's. TKN was modeled at 1.5 mg/L in the expanded facility effluent. 3.0 mg/L TN is generally regarded as refractory, which leaves only 1 mg/L degradable TN in the effluent. As such, no TKN limits were applied to the permit. Should future monitoring indicate TKN limits are required, they may be applied to the permit as needed.

TSS limits were evaluated and applied to the draft permit based on the approved TMDL TSS allocation for this facility and the Federal Effluent Guideline requirements for secondary treatment. Per the approved TMDL for Opequon Creek, the Parkins Mills WWTF is restricted to an annual TSS discharge of 87.04 metric tons per year. Concentration and loading based limits were applied to each flow tier in accordance with the TMDL loading allocation and Federal Secondary Treatment Standards. The monitoring frequency was set at 1/Week to ensure the TMDL allocation is maintained.

The pH limits reflect the current Water Quality Standards for pH in the receiving stream and effluent and have been carried forward from the previous permit.

EVALUATION OF THE EFFLUENT – DISINFECTION: 2.0 MGD (Expanded) – 5.0 MGD

The E. coli limits have been carried forward from the previous permit. These limits reflect the current Water Quality Standard for E. coli in the receiving stream and meet the requirements included in the approved TMDL for Opequon Creek.

EVALUATION OF THE EFFLUENT – NUTRIENTS: 2.0 MGD (Expanded) – 5.0 MGD

9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. Per the requirements of DEQ guidance, TN and TP annual average concentration limits are included in the permit. The TN annual average effluent limitations were revised from 3.0 mg/L to 4.0 mg/L during the 2007 permit modification. The modification was made following a demonstration by the owner that the lower effluent concentration limitation is unnecessary for the facility to meet their TN wasteload allocation, which is based on a TN effluent concentration of 4.0 mg/L and an average daily flow of 5.0 MGD. DEQ OWE reviewed the facility expansion plans and specifications based on TN and TP annual concentration limits of 4.0 mg/L and 0.3 mg/L, respectively. The TN and TP limitations become effective January 1st following CTO issuance for nutrient removal equipment.

9 VAC 25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.

Additional discussion of the facility's coverage under the nutrient GP and their nutrient WLAs is included in the 2.0 MGD (Existing) evaluation.

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EVALUATION OF THE EFFLUENT – TOXIC POLLUTANTS: 2.0 MGD (Expanded) – 5.0 MGD

NOTE: The Ammonia-N, TRC, and Chloride WQS_WLA and STAT.exe evaluations for the expanded 5.0 MGD facility 2.0 MGD permitted flow tier are represented in the existing facility 2.0 MGD design flow tier evaluation. As such, separate redundant evaluations are not included below.

Input parameters for instream WQC and WLAs are included in the 2.0 MGD (Existing) evaluation.

WQC monitoring for toxics in the expanded facility discharge is required within one year of CTO issuance for the expanded facility. At this reissuance, Chloride, Ammonia-N and TRC are known to exist in the discharge at concentrations which require limiting. Current agency guidelines recommend the evaluation of pollutant limits for total residual chlorine (TRC) and Ammonia-N based on default effluent concentrations of 20 mg/L and 9 mg/L, respectively. The effluent data were analyzed per the protocol for evaluation of effluent toxic pollutants included in this appendix with the following results:

- ? Total Residual Chlorine (TRC): TRC monthly and maximum weekly average limits are required for this discharge. The permittee previously requested these limits not be applied to the permit because there will be no addition of chlorine to the wastewater at the expanded facilities. Final disinfection will be via ultra-violet light irradiation.
- ? Ammonia-N: Ammonia-N monthly and maximum weekly average seasonal limits are required for this discharge. These limits are less stringent than the limits determined from the previous evaluation in 2005. New effluent data evaluated at this reissuance indicates a reduction in the 90th percentile effluent pH. This new information warrants a revision to the Ammonia-N limits, and complies with the Antidegradation requirements of 9 VAC 25-31-220.L.
- ? Chloride: TRC monthly and maximum weekly average limits are required for this discharge. These limits were determined necessary at this reissuance based on the Attachment A monitoring data submitted by the permittee. These limits become effective immediately following CTO issuance for the expanded facility.

The permittee must monitor the effluent at outfall 001 for all WQS parameters included in Attachment A of the permit once within one year from the expanded facility CTO issuance date.

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TOXLARGE: 2.0 MGD (Expanded) – 5.0 MGD

Parameter	CASRN	Type	QL (µg/L)	Data (µg/L unless noted otherwise)	Source of Data	Data Eval
Ammonia-N (mg/L)	766-41-7	X	0.2 mg/L	Default = 9 mg/L	b	C.2
Chloride (mg/L)	16887-00-6	X	---	198	a	C.2
TRC (mg/L)	7782-50-5	X	0.1 mg/L	Default = 20 mg/L	b	C.2

"Type" column indicates a category assigned to the referenced substance (see below):

A = Acid Extractable Organic Compounds

B = Base/Neutral Extractable Organic Compounds

M = Metals

p = PCBs

P = Pesticides

V = Volatile Organic Compounds

X = Miscellaneous Compounds and Parameters

"Source of Data" codes:

a = Permittee monitoring

b = Agency default values per GM 00-2011

"Data Evaluation" codes:

See section titled "EVALUATION OF EFFLUENT TOXIC POLLUTANTS" (preceding the parameter table) for an explanation of the code used.

The superscript "C" following the parameter name indicates that the substance is a known or suspected carcinogen; human health criteria at risk level 10^{-5} .

CASRN = Chemical Abstract Service Registry Number for each parameter is referenced in the current Water Quality Standards. A unique numeric identifier designating only one substance. The Chemical Abstract Service is a division of the American Chemical Society.

WQS-WLA SPREADSHEET INPUT: 3.0 MGD

WATER QUALITY CRITERIA / WASTE LOAD ALLOCATION ANALYSIS

Facility Name:
Parkins Mills WWTF

Receiving Stream:
Opequon Creek

Permit No.: VA0075191
Date: 12/3/2007

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information	Stream Flows	Mixing Information	Effluent Information
Mean Hardness (as CaCO ₃) = 235 mg/L	1Q10 (Annual) = 0.32 MGD	Annual - 1Q10 Flow = 100 %	Mean Hardness (as CaCO ₃) = 254 mg/L
90% Temperature (Annual) = 22.1 deg C	7Q10 (Annual) = 0.43 MGD	- 7Q10 Flow = 100 %	90% Temp (Annual) = 25 deg C
90% Temperature (Wet season) = 15.8 deg C	30Q10 (Annual) = 0.63 MGD	- 30Q10 Flow = 100 %	90% Temp (Wet season) = 20 deg C
90% Maximum pH = 8.5 SU	1Q10 (Wet season) = 0.89 MGD	Wet Season - 1Q10 Flow = 100 %	90% Maximum pH = 7.7 SU
10% Maximum pH = 7.8 SU	30Q10 (Wet season) = 1.93 MGD	- 30Q10 Flow = 100 %	10% Maximum pH = 7.3 SU
Tier Designation = 1	30Q5 = 0.89 MGD		Current Discharge Flow = 2.000 MGD
Public Water Supply (PWS) Y/N? = N	Harmonic Mean = 2.94 MGD		Discharge Flow for Limit Analysis = 3.000 MGD
V(alley) or P(iedmont)? = V	Annual Average = 12.3 MGD		
Trout Present Y/N? = N			
Early Life Stages Present Y/N? = Y			

Footnotes:

- All concentrations expressed as micrograms/liter (µg/l), unless noted otherwise.
- All flow values are expressed as Million Gallons per Day (MGD).
- Discharge volumes are highest monthly average or 2C maximum for Industries and design flows for Municipals.
- Hardness expressed as mg/l CaCO₃. Standards calculated using Hardness values in the range of 25-400 mg/l CaCO₃.
- "Public Water Supply" protects for fish & water consumption. "Other Surface Waters" protects for fish consumption only.
- Carcinogen "Y" indicates carcinogenic parameter.
- Ammonia WQSs selected from separate tables, based on pH and temperature.
- Metals measured as Dissolved, unless specified otherwise.
- WLA = Waste Load Allocation (based on standards).
- WLA = Waste Load Allocation (based on standards).
- WLAs are based on mass balances (less background, if data exist).
- Acute - 1 hour avg. concentration not to be exceeded more than 1/3 years.
- Chronic - 4 day avg. concentration (30 day avg. for Ammonia) not to be exceeded more than 1/3 years.
- Mass balances employ 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Actual flows employed are a function of the mixing analysis and may be less than the actual critical flows.
- Effluent Limitations are calculated elsewhere using the minimum WLA and EPA's statistical approach (Technical Support Document).

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WQS-WLA SPREADSHEET OUTPUT: 3.0 MGD

<u>Facility Name:</u> Parkins Mills WWTF		<u>Permit No.:</u> VA0075191		POST - EXPANSION		NON-ANTIDEGRADATION				
<u>Receiving Stream:</u> Opequon Creek		<u>Date:</u> 12/3/2007		3.000 MGD Discharge Flow - Mix per "Mixer"		WASTE LOAD ALLOCATIONS				
				<u>Human Health</u>		3.000 MGD Discharge - Mix per "Mixer"				
				Public Water		Other Surface		<u>Aquatic Protection</u>		Human
<u>Toxic Parameter and Form</u>		<u>Carcinogen?</u>	<u>Acute</u>	<u>Chronic</u>	<u>Supplies</u>	<u>Waters</u>	<u>Acute</u>	<u>Chronic</u>	<u>Health</u>	
Ammonia-N (Annual)	N	1.4E+01 mg/L	1.7E+00 mg/L	None	None	None	1.5E+01 mg/L	2.1E+00 mg/L	N/A	
Ammonia-N (Wet season)	N	1.2E+01 mg/L	2.3E+00 mg/L	None	None	None	1.6E+01 mg/L	3.7E+00 mg/L	N/A	
Chloride	N	8.6E+02 mg/L	2.3E+02 mg/L	2.5E+02 mg/L	None	None	9.5E+02 mg/L	2.6E+02 mg/L	N/A	
Chlorine, Total Residual	N	1.9E-02 mg/L	1.1E-02 mg/L	None	None	None	2.1E-02 mg/L	1.3E-02 mg/L	N/A	

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Chemical = Chloride
Chronic averaging period = 4
WLA_A = 950
WLA_C = 260
Q.L. = 1.0
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 355
Variance = 45369
C.V. = 0.6
97th percentile daily values = 863.863
97th percentile 4 day average = 590.645
97th percentile 30 day average = 428.148
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 380.26944385384
Average Weekly limit = 380.26944385384
Average Monthly Limit = 380.26944385384

The data are: 355

Chemical = TRC
Chronic averaging period = 4
WLA_A = 0.021
WLA_C = 0.013
Q.L. = 0.1
samples/mo. = 30
samples/wk. = 7

Summary of Statistics:

observations = 1
Expected Value = 20
Variance = 144
C.V. = 0.6
97th percentile daily values = 48.6683
97th percentile 4 day average = 33.2758
97th percentile 30 day average = 24.1210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 0.019013472192692
Average Weekly limit = 1.16116644934563E-02
Average Monthly Limit = 9.42347921730776E-03

The data are: 20

WQS-WLA SPREADSHEET INPUT: 4.0 MGD

WATER QUALITY CRITERIA / WASTE LOAD ALLOCATION ANALYSIS

Facility Name:
Parkins Mills WWTF
Receiving Stream:
Opequon Creek

Permit No.: VA0075191
Date: 12/3/2007

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO₃) = 235 mg/L
90% Temperature (Annual) = 22.1 deg C
90% Temperature (Wet season) = 15.8 deg C
90% Maximum pH = 8.5 SU
10% Maximum pH = 7.8 SU
Tier Designation = 1
Public Water Supply (PWS) Y/N? = N
V(alley) or P(iedmont)? = V
Trout Present Y/N? = N
Early Life Stages Present Y/N? = Y

Stream Flows

1Q10 (Annual) = 0.32 MGD
7Q10 (Annual) = 0.43 MGD
30Q10 (Annual) = 0.63 MGD
1Q10 (Wet season) = 0.89 MGD
30Q10 (Wet season) = 1.93 MGD
30Q5 = 0.89 MGD
Harmonic Mean = 2.94 MGD
Annual Average = 12.3 MGD

Mixing Information

Annual - 1Q10 Flow = 100 %
- 7Q10 Flow = 100 %
- 30Q10 Flow = 100 %
Wet Season - 1Q10 Flow = 100 %
- 30Q10 Flow = 100 %

Effluent Information

Mean Hardness (as CaCO₃) = 254 mg/L
90% Temp (Annual) = 25 deg C
90% Temp (Wet season) = 20 deg C
90% Maximum pH = 7.7 SU
10% Maximum pH = 7.3 SU
Current Discharge Flow = 2.000 MGD
Discharge Flow for Limit Analysis = 4.000 MGD

Footnotes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise.
- All flow values are expressed as Million Gallons per Day (MGD).
- Discharge volumes are highest monthly average or 2C maximum for Industries and design flows for Municipals.
- Hardness expressed as mg/l CaCO₃. Standards calculated using Hardness values in the range of 25-400 mg/l CaCO₃.
- "Public Water Supply" protects for fish & water consumption. "Other Surface Waters" protects for fish consumption only.
- Carcinogen "Y" indicates carcinogenic parameter.
- Ammonia WQSs selected from separate tables, based on pH and temperature.
- Metals measured as Dissolved, unless specified otherwise.
- WLA = Waste Load Allocation (based on standards).
- WLA = Waste Load Allocation (based on standards).
- WLAs are based on mass balances (less background, if data exist).
- Acute - 1 hour avg. concentration not to be exceeded more than 1/3 years.
- Chronic - 4 day avg. concentration (30 day avg. for Ammonia) not to be exceeded more than 1/3 years.
- Mass balances employ 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Actual flows employed are a function of the mixing analysis and may be less than the actual critical flows.
- Effluent Limitations are calculated elsewhere using the minimum WLA and EPA's statistical approach (Technical Support Document).

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WQS-WLA SPREADSHEET OUTPUT: 4.0 MGD

<u>Facility Name:</u> Parkins Mills WWTF		<u>Permit No.:</u> VA0075191		POST - EXPANSION		NON-ANTIDEGRADATION			
<u>Receiving Stream:</u> Opequon Creek		<u>Date:</u> 12/3/2007		4.000 MGD Discharge Flow - Mix per "Mixer"		WASTE LOAD ALLOCATIONS			
				<u>Human Health</u>		4.000 MGD Discharge - Mix per "Mixer"			
				Public Water		Other Surface			
				<u>Supplies</u>		<u>Waters</u>			

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Chemical = Chloride
Chronic averaging period = 4
WLAa = 930
WLAc = 250
Q.L. = 1.0
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 355
Variance = 45369
C.V. = 0.6
97th percentile daily values = 863.863
97th percentile 4 day average = 590.645
97th percentile 30 day average = 428.148
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 365.643696013308
Average Weekly limit = 365.643696013308
Average Monthly Limit = 365.643696013308

The data are: 355

Chemical = TRC
Chronic averaging period = 4
WLAa = 0.021
WLAc = 0.012
Q.L. = 0.1
samples/mo. = 30
samples/wk. = 7

Summary of Statistics:

observations = 1
Expected Value = 20
Variance = 144
C.V. = 0.6
97th percentile daily values = 48.6683
97th percentile 4 day average = 33.2758
97th percentile 30 day average = 24.1210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 1.75508974086388E-02
Average Weekly limit = 1.07184595324212E-02
Average Monthly Limit = 8.69859620059178E-03

The data are: 20

WQS-WLA SPREADSHEET INPUT: 5.0 MGD

WATER QUALITY CRITERIA / WASTE LOAD ALLOCATION ANALYSIS

Facility Name:
Parkins Mills WWTF
Receiving Stream:
Opequon Creek

Permit No.: VA0075191
Date: 12/3/2007

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information	Stream Flows	Mixing Information	Effluent Information
Mean Hardness (as CaCO ₃) = 235 mg/L	1Q10 (Annual) = 0.32 MGD	Annual - 1Q10 Flow = 100 %	Mean Hardness (as CaCO ₃) = 254 mg/L
90% Temperature (Annual) = 22.1 deg C	7Q10 (Annual) = 0.43 MGD	- 7Q10 Flow = 100 %	90% Temp (Annual) = 25 deg C
90% Temperature (Wet season) = 15.8 deg C	30Q10 (Annual) = 0.63 MGD	- 30Q10 Flow = 100 %	90% Temp (Wet season) = 20 deg C
90% Maximum pH = 8.5 SU	1Q10 (Wet season) = 0.89 MGD	Wet Season - 1Q10 Flow = 100 %	90% Maximum pH = 7.7 SU
10% Maximum pH = 7.8 SU	30Q10 (Wet season) = 1.93 MGD	- 30Q10 Flow = 100 %	10% Maximum pH = 7.3 SU
Tier Designation = 1	30Q5 = 0.89 MGD		Current Discharge Flow = 2.000 MGD
Public Water Supply (PWS) Y/N? = N	Harmonic Mean = 2.94 MGD		Discharge Flow for Limit Analysis = 5.000 MGD
V(alley) or P(iedmont)? = V	Annual Average = 12.3 MGD		
Trout Present Y/N? = N			
Early Life Stages Present Y/N? = Y			

Footnotes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise.
- All flow values are expressed as Million Gallons per Day (MGD).
- Discharge volumes are highest monthly average or 2C maximum for Industries and design flows for Municipals.
- Hardness expressed as mg/l CaCO₃. Standards calculated using Hardness values in the range of 25-400 mg/l CaCO₃.
- "Public Water Supply" protects for fish & water consumption. "Other Surface Waters" protects for fish consumption only.
- Carcinogen "Y" indicates carcinogenic parameter.
- Ammonia WQSs selected from separate tables, based on pH and temperature.
- Metals measured as Dissolved, unless specified otherwise.
- WLA = Waste Load Allocation (based on standards).
- WLA = Waste Load Allocation (based on standards).
- WLAs are based on mass balances (less background, if data exist).
- Acute - 1 hour avg. concentration not to be exceeded more than 1/3 years.
- Chronic - 4 day avg. concentration (30 day avg. for Ammonia) not to be exceeded more than 1/3 years.
- Mass balances employ 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Actual flows employed are a function of the mixing analysis and may be less than the actual critical flows.
- Effluent Limitations are calculated elsewhere using the minimum WLA and EPA's statistical approach (Technical Support Document).

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WQS-WLA SPREADSHEET OUTPUT: 5.0 MGD

<u>Facility Name:</u> Parkins Mills WWTF		<u>Permit No.:</u> VA0075191		POST - EXPANSION		NON-ANTIDEGRADATION				
<u>Receiving Stream:</u> Opequon Creek		<u>Date:</u> 12/3/2007		5.000 MGD Discharge Flow - Mix per "Mixer"		WASTE LOAD ALLOCATIONS				
				<u>Human Health</u>		5.000 MGD Discharge - Mix per "Mixer"				
				Public Water		Other Surface		<u>Aquatic Protection</u>		Human
<u>Toxic Parameter and Form</u>		<u>Carcinogen?</u>	<u>Acute</u>	<u>Chronic</u>	<u>Supplies</u>	<u>Waters</u>	<u>Acute</u>	<u>Chronic</u>	<u>Health</u>	
Ammonia-N (Annual)	N	1.4E+01 mg/L	1.8E+00 mg/L	None	None	1.5E+01 mg/L	2.0E+00 mg/L	N/A		
Ammonia-N (Wet season)	N	1.3E+01 mg/L	2.4E+00 mg/L	None	None	1.5E+01 mg/L	3.3E+00 mg/L	N/A		
Chloride	N	8.6E+02 mg/L	2.3E+02 mg/L	2.5E+02 mg/L	None	9.2E+02 mg/L	2.5E+02 mg/L	N/A		
Chlorine, Total Residual	N	1.9E-02 mg/L	1.1E-02 mg/L	None	None	2.0E-02 mg/L	1.2E-02 mg/L	N/A		

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Chemical = Chloride
Chronic averaging period = 4
WLAa = 920
WLAc = 250
Q.L. = 1.0
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 355
Variance = 45369
C.V. = 0.6
97th percentile daily values = 863.863
97th percentile 4 day average = 590.645
97th percentile 30 day average = 428.148
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 365.643696013308
Average Weekly limit = 365.643696013308
Average Monthly Limit = 365.643696013308

The data are: 355

Chemical = TRC
Chronic averaging period = 4
WLAa = 0.020
WLAc = 0.012
Q.L. = 0.1
samples/mo. = 30
samples/wk. = 7

Summary of Statistics:

observations = 1
Expected Value = 20
Variance = 144
C.V. = 0.6
97th percentile daily values = 48.6683
97th percentile 4 day average = 33.2758
97th percentile 30 day average = 24.1210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 1.75508974086388E-02
Average Weekly limit = 1.07184595324212E-02
Average Monthly Limit = 8.69859620059178E-03

The data are: 20

OCCS REPORT & DO FLOW MODEL: ALL FLOW TIERS

As part of the 2005 permit modification, the owner submitted an updated flow model for Opequon Creek. The *Opequon Creek Capacity Study* replaced the *1992 Donohue Wasteload Allocation Study*, from which the Parkins Mills WWTF BOD, DO, and Ammonia-N limits were based. The OCCS study includes a DO flow model of Opequon Creek which assesses the stream impact associated with the Parkins Mills discharge (existing and the requested expansions), the Frederick County Landfill discharge (maximum loading condition), and the Opequon Water Reclamation Facility discharge. The OCCS model is a DIURNAL based program which is similar to the USEPA supported QUAL2E model.

Per the model developer (HydroQual):

1. DO values continue to increase to Turkey Run due to reducing CBOD and NH₃ levels (less DO consumption) and atmospheric reaeration. When the DO levels are at or above saturation, this is due to algal photosynthesis (oxygen production). When the algal oxygen production exceeds the amount of oxygen that is lost to the atmosphere, DO levels can become super-saturated.
2. CBOD and NBOD from the point-sources within the model will continue to decrease in the downstream direction back to background conditions (downstream from the end of the model) due to continued decay of CBOD and NH₃. Other inputs of CBOD and NH₃ downstream will ultimately determine what CBOD and NH₃ levels will be maintained downstream.
3. Output for the model is provided roughly every 0.5 miles. For the Alleghany County DIURNAL model (lower Jackson/James River) that was provided to VDEQ, an output frequency of between 0.2-1 miles was used and for the Mead-Westvaco DIURNAL model (Jackson River) an output frequency of 0.1-0.5 miles was used. Since for each model reach the model characteristics are the same (e.g., geometry, incremental

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flow and WQ, constants, temperature), the calculated variation in each reach is continuous (i.e., there will be no sudden changes in model output between the outputted mile points). Therefore, additional model output at 0.1 increments would not add any additional information to the report and intermediate model output can be closely estimated by interpolating between the current model outputs.

4. Estimates of the distance downstream where DO impacts are noticeable from the 3 point-sources (PMWWTF, FCL, OWRF) are as follows: Roughly, the DO impact from the PMWWTF extends about 6.5 miles below the outfall (until the FCL and OWRF discharges). The DO impact from the FCL extends about 5 miles below the outfall (until the OWRF discharge). The DO impact from the OWRF extends about 15 miles below the outfall (until the end of the model). These estimates are based on model runs with and without the discharges using the summer/sunny conditions with PMWWTF at 2 MGD and 5 MGD.

APPENDIX D

RATIONALE FOR TOXICS MANAGEMENT PROGRAM (TMP) REQUIREMENTS - (July 12, 2005)

This discharge was evaluated for TMP requirements during the 2005 permit modification. Whole Effluent Toxicity (WET) limits were deemed necessary at that time and applied to the permit. Because the 2.0 MGD (Existing) WET limit compliance date extended beyond the permit expiration, the owner was notified via the 2005 modification final permit transmittal letter that the WET limit would be applied to the 2008 reissued permit.

Outfall 001: This discharge qualifies as being subject to TMP monitoring, because it is a municipal sewage treatment plant with a design flow greater than 1 MGD and it has a pretreatment program (TMP Guidance 00-2012, Parts IV.2.A. and IV.2.B., respectively). Since this permit was reissued in 2003, there was only one set of annual tests available for review.

The data from the most recent report was evaluated using the procedures outlined in the TMP Guidance. Although the results met the initial permit criteria, an additional step involves expressing the results of the toxicity tests as Toxicity Units (TU) and entering them separately by species into the Agency's STAT.exe program. In order to do this, the acute and chronic Wasteload Allocations (WLAs) generated from the WETLimit10.xls spreadsheet were also needed. The STAT.exe calculations were completed at the current design flow, Flow Tier 1 (2.0 MGD), for both the acute and chronic test data (calculations on following page). Based on the evaluation of data, a chronic WET limit (TU_c) will be required. The TU_c is considered a maximum and is how the results are to be reported on the DMR. The permittee will have until September 30, 2008 to meet the WET limit at Flow Tier 1.

The permittee has also requested that several higher flow tiers be included in the permit. The requirements of the 2.0 MGD expanded facility permitted flow tier are the same as the 2.0 MGD existing facility design flow tier. However, because upgrades will be required for the expanded facility and will involve the issuance of a CTO, the 2.0 MGD expanded facility TU_c will become effective upon issuance of the CTO and will supersede the 2008 deadline. The permittee will be required to complete their first quarterly test within the calendar quarter that is six months from the date of issuance of the CTO. A most-sensitive species will not be selected. As per the TMP Guidance and the "published rule" (EPA Form 2A application requirements), testing effluent from the existing facility will require both species (*Ceriodaphnia dubia* and *Pimephales promelas*) for the chronic tests. The chronic WET limit for each flow tier is listed below, along with the recommended dilution series:

Design Flow (MGD)	WET Limit (TU_c)	NOEC	Recommended Dilution Series	Limits effective
2.0 (Existing)	1.75	$\geq 57\%$	100, 75.5, 57 , 43, 32.5%	September 30, 2008
2.0	1.75	$\geq 57\%$	100, 75.5, 57 , 43, 32.5%	Upon issuance of CTO
3.0	1.67	$\geq 60\%$	100, 77.5, 60 , 46.5, 36%	Upon issuance of CTO
4.0	1.61	$\geq 62\%$	100, 78.7, 62 , 48.8, 38.4%	Upon issuance of CTO
5.0	1.59	$\geq 63\%$	100, 79.4, 63 , 50, 39.7%	Upon issuance of CTO

While the results of STAT.exe indicated that an acute WET limit (TU_a) is also required, the mean of the data does not exceed a TU_a of 1.0. Therefore, there is no acute WET limit required at this time. Should further information clearly indicate the cause of toxicity for this discharge, a pollutant specific effluent limitation can be used in lieu of a WET limit.

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STAT.exe Results:

<p>10/13/2004 9:29:40 AM Facility = Parkins Mill STP Chemical = <u>Chronic Minnow - 2.0 MGD</u> Chronic averaging period = 4 WLAa,c = 3.48 WLAc = 1.215 Q.L. = 1 # samples/mo. = 1 # samples/wk. = 1</p> <p>Summary of Statistics: # observations = 1 Expected Value = 1 Variance = .36 C.V. = 0.6 97th percentile daily values = 2.43341 97th percentile 4 day average = 1.66379 97th percentile 30 day average = 1.20605 # < Q.L. = 0 Model used = BPJ Assumptions, type 2 data</p> <p>A limit is needed based on Chronic Toxicity Maximum Daily Limit = 1.77702836262468 Average Weekly Limit = 1.77702836262468 Average Monthly Limit = 1.77702836262468</p> <p>The data are: 1</p>	<p>10/13/2004 9:33:52 AM Facility = Parkins Mill STP Chemical = <u>Acute Minnow - 2.0 MGD</u> Chronic averaging period = 4 WLAa = 0.348 WLAc = Q.L. = 1 # samples/mo. = 1 # samples/wk. = 1</p> <p>Summary of Statistics: # observations = 1 Expected Value = 1 Variance = .36 C.V. = 0.6 97th percentile daily values = 2.43341 97th percentile 4 day average = 1.66379 97th percentile 30 day average = 1.20605 # < Q.L. = 0 Model used = BPJ Assumptions, type 2 data</p> <p>A limit is needed based on Acute Toxicity Maximum Daily Limit = 0.348 Average Weekly Limit = 0.348 Average Monthly Limit = 0.348</p> <p>The data are: 1</p>
<p>10/13/2004 9:30:24 AM Facility = Parkins Mill STP Chemical = <u>Chronic Flea - 2.0 MGD</u> Chronic averaging period = 4 WLAa,c = 3.48 WLAc = 1.215 Q.L. = 1 # samples/mo. = 1 # samples/wk. = 1</p> <p>Summary of Statistics: # observations = 1 Expected Value = 1.1 Variance = .4356 C.V. = 0.6 97th percentile daily values = 2.67675 97th percentile 4 day average = 1.83016 97th percentile 30 day average = 1.32665 # < Q.L. = 0 Model used = BPJ Assumptions, type 2 data</p> <p>A limit is needed based on Chronic Toxicity Maximum Daily Limit = 1.77702836262468 Average Weekly Limit = 1.77702836262468 Average Monthly Limit = 1.77702836262468</p> <p>The data are: 1.1</p>	<p>10/13/2004 9:34:46 AM Facility = Parkins Mill STP Chemical = <u>Acute Flea - 2.0 MGD</u> Chronic averaging period = 4 WLAa = 0.348 WLAc = Q.L. = 1 # samples/mo. = 1 # samples/wk. = 1</p> <p>Summary of Statistics: # observations = 1 Expected Value = 1 Variance = .36 C.V. = 0.6 97th percentile daily values = 2.43341 97th percentile 4 day average = 1.66379 97th percentile 30 day average = 1.20605 # < Q.L. = 0 Model used = BPJ Assumptions, type 2 data</p> <p>A limit is needed based on Acute Toxicity Maximum Daily Limit = 0.348 Average Weekly Limit = 0.348 Average Monthly Limit = 0.348</p> <p>The data are: 1</p>

APPENDIX E

PERMIT CHANGES AND BASES FOR SPECIAL CONDITIONS

Tabulated below are the sections of the permit, with any changes and the reasons for the changes identified. Also provided is the basis for each of the permit special conditions.

Cover Page	<ul style="list-style-type: none">• Content and format as prescribed by the VPDES Permit Manual.• Updated the facility location address.
Part I.A.1.	<p>Effluent Limitations and Monitoring Requirements: Bases for effluent limits provided in previous pages of this fact sheet. Monitoring requirements as prescribed by the VPDES Permit Manual.</p> <p><i>Updates Part I.A.1. of the previous permit with the following:</i></p> <ul style="list-style-type: none">• CBOD₅ (Jun-Nov) limits were adjusted per new significant figures guidance.• TRC monthly average limit was adjusted per new significant figures guidance.• Chloride monthly and weekly average limits were included with a footnote referencing the associated schedule of compliance for meeting these new limits.• The WET limit established in conjunction with 2005 modification was added with a footnote referencing the associated monitoring and schedule of compliance for meeting the limit.• A footnote was added referencing this facility's coverage under the Nutrient GP.
Part I.A.2.	<p>Effluent Limitations and Monitoring Requirements: Bases for effluent limits provided in previous pages of this fact sheet. Monitoring requirements as prescribed by the VPDES Permit Manual.</p> <p><i>Updates Part I.A.2. of the previous permit with the following:</i></p> <ul style="list-style-type: none">• Per DEQ guidance the 3.0 MGD (Dec-May) seasonal flow tier was removed.• Less stringent Ammonia-N limits were included based on new effluent information.• CBOD₅ (Jun-Nov) limits were adjusted per new significant figures guidance.• CBOD₅ (Dec-May) load limits are now based on an effluent flow of 2.0 MGD, not 3.0 MGD.• TSS (Dec-May) limits were removed and the previous TSS (Jun-Nov) limits were applied on an annual basis.• Chloride monthly and weekly average limits were added to the permit.• The WET limit established in conjunction with 2005 modification was added with a footnote referencing the associated monitoring.• Nutrient monitoring with TN and TP annual average concentration limits were added to the permit with associated footnotes regarding monitoring and reporting for these parameters.• A footnote was added referencing this facility's coverage under the Nutrient GP.

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- Part I.A.3. **Effluent Limitations and Monitoring Requirements:** Bases for effluent limits provided in previous pages of this fact sheet. Monitoring requirements as prescribed by the VPDES Permit Manual.
Updates Part I.A.3. of the previous permit with the following:
- Per DEQ guidance the 4.3 MGD (Dec-May) seasonal flow tier was removed.
 - Less stringent Ammonia-N limits were included based on new effluent information.
 - CBOD₅ (Dec-May) load limits are now based on an effluent flow of 3.0 MGD, not 4.3 MGD.
 - TSS (Dec-May) limits were removed.
 - TSS load limits were revised to more accurately reflect the TMDL annual WLA.
 - Chloride monthly and weekly average limits were added to the permit.
 - The footnote referencing this facility's coverage under the Nutrient GP was revised.
- Part I.A.4. **Effluent Limitations and Monitoring Requirements:** Bases for effluent limits provided in previous pages of this fact sheet. Monitoring requirements as prescribed by the VPDES Permit Manual.
Updates Part I.A.4. of the previous permit with the following:
- Per DEQ guidance the 6.3 MGD (Dec-May) seasonal flow tier was removed.
 - Less stringent Ammonia-N limits were included based on new effluent information.
 - CBOD₅ (Dec-May) load limits are now based on an effluent flow of 4.0 MGD, not 6.3 MGD.
 - TSS (Dec-May) limits were removed.
 - TSS load limits were revised to more accurately reflect the TMDL annual WLA.
 - Chloride monthly and weekly average limits were added to the permit.
 - The footnote referencing this facility's coverage under the Nutrient GP was revised.
- Part I.A.5. **Effluent Limitations and Monitoring Requirements:** Bases for effluent limits provided in previous pages of this fact sheet. Monitoring requirements as prescribed by the VPDES Permit Manual.
Updates Part I.A.5. of the previous permit with the following:
- Per DEQ guidance the 7.6 MGD (Dec-May) seasonal flow tier was removed.
 - Less stringent Ammonia-N limits were included based on new effluent information.
 - CBOD₅ (Dec-May) load limits are now based on an effluent flow of 5.0 MGD, not 7.6 MGD.
 - TSS (Dec-May) limits were removed.
 - TSS load limits were revised to more accurately reflect the TMDL annual WLA.
 - Chloride monthly and weekly average limits were added to the permit.
 - The footnote referencing this facility's coverage under the Nutrient GP was revised.
- Part I.B. **Schedule of Compliance:** *New Requirement.* 9 VAC 25-31-250 allows for schedules of compliance, when appropriate, which will lead to compliance with the Clean Water Act, the State Water Control Law and regulations promulgated under them.
- Part I.C. **Effluent Limitations and Monitoring Requirements – Additional Instructions:** *Updates Part I.B. of the previous permit.* Authorized by VPDES Permit Regulation, 9 VAC 25-31-190 J 4 and 220 I. This condition is necessary when a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

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- Part I.D. **Pretreatment Program Requirements:** *Identical to Part I.C. of the previous permit.* VPDES Permit Regulation, 9 VAC 25-31-730 through 900, and 40 CFR part 403 require certain existing and new sources of pollution to meet specified regulations.
- Part I.E. **Toxics Management Program Requirements:** *Updates Part I.D. of the previous permit.* VPDES Permit Regulation, 9 VAC 25-31-210 and 220 I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act.
- Part I.F.1. **95% Capacity Reopener:** *Identical to Part I.E.1. of the previous permit.* Required by VPDES Permit Regulation, 9 VAC 25-31-200 B 4 for certain permits.
- Part I.F.2. **Indirect Dischargers :** *Identical to Part I.E.2. of the previous permit.* Required by VPDES Permit Regulation, 9 VAC 25-31-200 B 1 for all STPs that receive waste from someone other than the owner of the treatment works.
- Part I.F.3. **Materials Handling/Storage:** *Identical to Part I.E.3. of the previous permit.* 9 VAC 25-31-280.B.2. requires that the types and quantities of “wastes, fluids, or pollutants which are ... treated, stored, etc.” be addressed for all permitted facilities.
- Part I.F.4. **O&M Manual Requirement:** *Updates Part I.E.5. of the previous permit.* Required by Code of Virginia 62.1-44.19, SCAT Regulations 9 VAC 25-790, and VPDES Permit Regulation 9 VAC 25-31-190 E for all STPs. Added requirement to describe procedures for handling, storage and disposal of materials that will prevent pollutants from reaching State waters per 9 VAC 25-31-280.B.2. Also added requirement to describe procedures for documenting compliance with the permit requirement that there shall be no discharge of floating solids or visible foam in other than trace amounts.
- Part I.F.5. **CTC/CTO Requirement:** *Updates Part I.E.4. of the previous permit.* Required by Code of Virginia 62.1-44.19, SCAT Regulations 9 VAC 25-790, and VPDES Permit Regulation 9 VAC 25-31-190 E for all STPs. 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade.
- Part I.F.6. **SMP Requirement:** *Updates Part I.E.7. of the previous permit.* VPDES Permit Regulation 9 VAC 25-31-100 J, 220 B 2, and 420 through 720, and 40 CFR Part 503 require all STPs to submit information on their sludge use and disposal practices and to meet specified standards for sludge use and disposal. Technical requirements are derived from the Department of Health’s Biosolids Use Regulations, 12 VAC 5-585-10 et seq.
- Part I.F.7. **Licensed Operator Requirement:** *Updates Part I.E.8. of the previous permit.* The VPDES Permit Regulation 9 VAC 25-31-200 C, the Code of Virginia 54.1-2300 et seq., and Rules and Regulations for Waterworks and Wastewater Works Operators 18 VAC 160-20-10 et seq., require licensure of operators. A class II license is indicated for this facility.
- Part I.F.8. **Reliability Class:** *Identical to Part I.E.9. of the previous permit.* Required by SCAT Regulations 9 VAC 25-790.
- Part I.F.9. **Water Quality Criteria Monitoring:** *Updates Part I.E.10. of the previous permit.* State Water Control Law at 62.1-44.21 authorizes the Board to request information needed to determine the discharge’s impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility’s effluent for the substances noted in Attachment A of this VPDES permit.

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- Part I.F.10. **Treatment Works Closure Plan:** *Updates Part I.E.12. of the previous permit.* Required for all STPs, per the State Water Control Law at Closure plans are required for all STPs, per the State Water Control Law at 62.1-44.18.C. and 62.1-44.15:1.1., and the SCAT Regulations at 9 VAC 25-790-450.E. and 9 VAC 25-790-120.E.3.
- Part I.F.11. **Reopeners:**
New Requirement: a. 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade.

Updates Part I.E.11. of the previous permit: b. 9 VAC 25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

Updates Part I.E.6. of the previous permit: c. Required by the VPDES Permit Regulation, 9 VAC 25-31-220.C, for all permits issued to STPs.
- Part I.F.12. **Suspension of concentration limits for E3/E4 facilities:** *New Requirement.* 9 VAC 25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.
- Part I.F.13. **Storm Water Management:** *New Requirement.* VPDES Permit Regulation 9 VAC 25-31-10 defines discharges of storm water from municipal treatment plants with design flow of 1.0 MGD or more, or plants with approved pretreatment programs, as discharges of storm water associated with industrial activity. 9 VAC 25-31-120 requires a permit for these discharges. The Pollution Prevention Plan requirements are derived from the VPDES general permit for discharges of storm water associated with industrial activity, 9 VAC 25-151-10 et seq.
- Part II **CONDITIONS APPLICABLE TO ALL VPDES PERMITS.** VPDES Permit Regulation 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.
- Deletions: The previous footnote regarding E. coli sampling and analysis was removed from Parts I.A.1-5.